IMPROVING COMMUNITIES TOGETHER

September 17, 2021

Christopher Gerrior, Chair
Rochester Conservation Commission
Town Hall Annex Building
37 Marion Road
Rochester, MA 02770

Attn: Merilee Kelly, Environmental Planner/Conservation Agent

Re: Notice of Intent – 45 Kings Highway MBTA Facility
Rochester, Massachusetts

Dear Chairperson Gerrior:

On behalf of the Massachusetts Bay Transportation Authority (MBTA), BETA Group, Inc. (BETA) and Jacobs Engineering Group, Inc. (Jacobs) are submitting a Notice of Intent in support of work proposed to increase and improve the storage and service capabilities of the MBTA facility (the Project) at 45 Kings Highway in Rochester (the Site). Work associated with the Project will include the construction of a secondary access road, installation of a potable water service line, installation of an electrical service line, repaving of bituminous areas, establishment of new railroad spur tracks and extension of existing spur tracks, expansion of storage areas, construction of a retaining wall to limit Buffer Zone and Resource Area disturbance, establishment of wetland replication areas, and implementation of long-term stormwater best management practices. The Project purpose is to increase the MBTA Rochester facility's capacity to provide critical service and storage resources for the South Coast Rail and Bourne Commuter Rail Service, thereby supporting the MBTA's efforts to proactively address ever-increasing servicing and storage requirements.

The Project will take place within Areas Subject to Protection and Jurisdiction under the Massachusetts Wetlands Protection Act (M.G.L. ch.131 s.40) and its implementing regulations at 310 CMR 10.00 (collectively "the Act"). Specifically, portions of the Project will result in impacts to Bordering Vegetated Wetland (BVW), Bank and Land Under Water (LUW) associated with an intermittent stream, and the 100-foot Buffer Zone to BVW and Bank. The Project will fully adhere to the Performance Standards for BVW, Bank, and LUW as set forth by the Act, and all post-development stormwater runoff will be managed in accordance with the Massachusetts Stormwater Management Regulations. Although the MBTA is not subject to local bylaws and ordinances, an effort has been made to preserve the 25-foot No Disturb Zone as defined in Section 5.3 of the Rochester Wetlands Protection Bylaw (Section XV) where feasible and consistent with the Project purpose.

Abutters within 100 feet of the Site have been notified of this filing via certificate of mailing in accordance with the requirements of the Act. Per its enabling legislation, the MBTA is not subject to local bylaws/filing fees or filing fees under the Act. However, the MBTA has elected to include a check in the amount of $1,000.00 to cover the town portion of the Act fee. A check in the amount of $25.00 has also been included to cover the legal ad fee as requested by the Conservation Agent.

We trust that the following application provides sufficient information to describe the Site, the work, and the effects of the work on interests identified in the Act, and therefore facilitating the issuance of an Order of Conditions. Should you have any additional questions, please do not hesitate to contact us.

Very truly yours,

BETA Group, Inc.

Jonathan Niro
Environmental Scientist

Marta J. Nover
Vice President

cc: Tess Paganelli (MBTA)
John Carrega (MBTA)
Peter Cruz (Jacobs)
Edward Pontes (Jacobs)
Gustavo Raposo
Christopher Ross
MassDEP SERO, Division of Wetlands

Job No: 20.07324.00

Rochester, Massachusetts

MBTA Rochester Facility Improvements

45 Kings Highway

September 2021

NOTICE OF INTENT

89 Shrewsbury Street
Suite 300
Worcester, MA 01604
508.756.1600
www.BETA-Inc.com

MBTA Rochester Facility Improvements

Rochester, Massachusetts

45 Kings Highway

NOTICE OF INTENT

Prepared by: BETA GROUP, INC. AND JACOBS ENGINEERING GROUP, INC.
Prepared for: Massachusetts Bay Transportation Authority

September 2021

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WPA FORM 3 – NOTICE OF INTENT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

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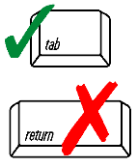
Rochester
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

45 Kings Highway — a. Street Address
Rochester — b. City/Town
02576 — c. Zip Code

Latitude and Longitude:
N 41.797774 — d. Latitude
W -70.780902 — e. Longitude

Map 17 — f. Assessors Map/Plat Number
Lot 21 — g. Parcel /Lot Number

2. Applicant:

Tess — a. First Name
Paganelli — b. Last Name
Massachusetts Bay Transportation Authority — c. Organization
10 Park Plaza, Suite 6720 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
617-549-4357 — h. Phone Number
i. Fax Number
tpaganelli@MBTA.com — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
Massachusetts Bay Transportation Authority — c. Organization
10 Park Plaza, Suite 6720 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Jonathan — a. First Name
Niro — b. Last Name
BETA Group, Inc. — c. Company
89 Shrewsbury Street — d. Street Address
Worcester — e. City/Town
MA — f. State
01604 — g. Zip Code
774-573-9694 — h. Phone Number
i. Fax Number
jniro@BETA-inc.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Fee Exempt — a. Total Fee Paid
Fee Exempt — b. State Fee Paid
Fee Exempt ($1,000.00 check included) — c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

The Project will involve the construction of a secondary access road, installation of utilities, repaving of a bituminous parking area, establishment of storage tracks/areas, construction of a retaining wall, construction of wetland and stream replication areas, and implementation of long-term stormwater best management practices at a Massachusetts Bay Transportation Authority facility. Work associated with the Project will result in impacts to Bank, Land Under Water, and Bordering Vegetated Wetland, which will be mitigated in accordance with the applicable Performance Standards. Further details are included in the attached narrative.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Plymouth	N/A
a. County	b. Certificate # (if registered land)
46719	120
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	110 (1. linear feet)	115 (2. linear feet)
b. ☒ Bordering Vegetated Wetland	3,000 (Perm.) 1,240 (Temp.) (1. square feet)	4,240 (2. square feet)
c. ☒ Land Under Waterbodies and Waterways	550 (1. square feet) 0 (3. cubic yards dredged)	575 (2. square feet)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced

f. ☐ Riverfront Area

1. Name of Waterway (if available) - **specify coastal or inland**

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet _____ b. square feet within 100 ft. _____ c. square feet between 100 ft. and 200 ft. _____

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   August 1, 2021
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☒ Is this an aquaculture project? d. ☐ Yes ☒ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☒ A portion of the site constitutes redevelopment

      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Rochester Mainenance Facility Cape Main Commuter Rail Rochester, Massachusetts Notice of Intent Submittal

Jacobs Engineering, Inc.	Thomas W. Morin, MA P.E. No. 40479
b. Prepared By	c. Signed and Stamped by
September 15, 2021	As noted
d. Final Revision Date	e. Scale

MBTA Rochester Facility Improvements Notice of Intent	September 2021
f. Additional Plan or Document Title	g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

105255	9/13/2021
2. Municipal Check Number	3. Check date
N/A	N/A
4. State Check Number	5. Check date
Frank	Romeo
6. Payor name on check: First Name	7. Payor name on check: Last Name

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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date: 9/15/2021
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date: 9/15/2021

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

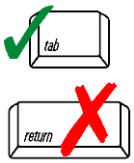
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

45 Kings Highway	Rochester
a. Street Address	b. City/Town
TBD (Town portion only)	$1,000.00
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Tess		Paganelli
a. First Name		b. Last Name
Massachusetts Bay Transporation Authority		
c. Organization		
10 Park Plaza, Suite 6720		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
617-549-4357		tpaganelli@mbta.com
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name		b. Last Name
Massachusetts Bay Transportation Authority		
c. Organization		
10 Park Plaza, Suite 6720		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 4.e.: Rail line construction	1	$1,450	$737.50 - Town portion only
Category 2.j: Other (establishment of storage areas)	1	$500	$262.50 - Town portion only

Step 5/Total Project Fee:

Step 6/Fee Payments:

Total Project Fee:	$1,000 - Town only a. Total Fee from Step 5
State share of filing Fee:	N/A - Exempt b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$1,000 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

ABUTTERS INFORMATION

RECE
AUG 16 2021
ROCHESTER ASSESSORS

Town of Rochester

Board of Assessors
One Constitution Way
Rochester, MA 02770

Phone: 508-763-3871 E-mail: assessors@townofrochester.com Fax: 508-763-4892

Board of Assessors:
Jana G. Cavanaugh
Diana L. Knapp, MAA, Chairperson
Debra M. Lalli, MAA

Assessing Staff:
Charles B. Shea, Principal Assessor
Debra M. Lalli, Assessment Administrator
Margaret J. Gonneville, Assessing Clerk

CERTIFICATION OF ABUTTERS' LIST

(FEE $25.00 – WE ARE NOT RESPONSIBLE FOR CERTIFIED MAILING)

IN CONFORMITY WITH MGL CHAPTER 40A, SECTION 11, THE PRESENT CERTIFIES THE ATTACHED LIST OF NAMES AND ADDRESSES AS DESCRIBING THE PARTIES OF INTEREST IN THE REFERENCED APPLICATION FOR PERMIT TO THE PERMIT GRANTING AUTHORITY OR SPECIAL PERMIT GRANTING AUTHORITY.

PERMIT APPLICANT: Tess Paganelli (MBTA)

DATE OF REQUEST: 8/16/2021

CONTACT INFORMATION: (NAME, PHONE ETC.) Jonathan Niro (BETA Group) Ph: 774-573-9694 Email: jniro@beta-inc.com

PROPERTY OWNER: MBTA

PROPERTY ADDRESS: 45 Kings Highway

PROPERTY MAP & LOT: Map 17, Lot 21

PERMIT GRANTING AUTHORITY: Conservation Commission

PROJECT: MBTA facility improvements

CIRCLE DISTANCE REQUESTED

(100 FEET) 500 FEET 300 FEET 100 FEET ABUTTER ABUTTER TO ABUTTER

****

LIST OF PARTIES OF INTEREST PREPARED BY: Margaret Gonneville

THE ATTACHED LIST IS CERTIFIED AS THE NAME AND ADDRESSES OF "PARTIES OF INTEREST" AS OF THE VALUATION DATE OF: January 1, 2021

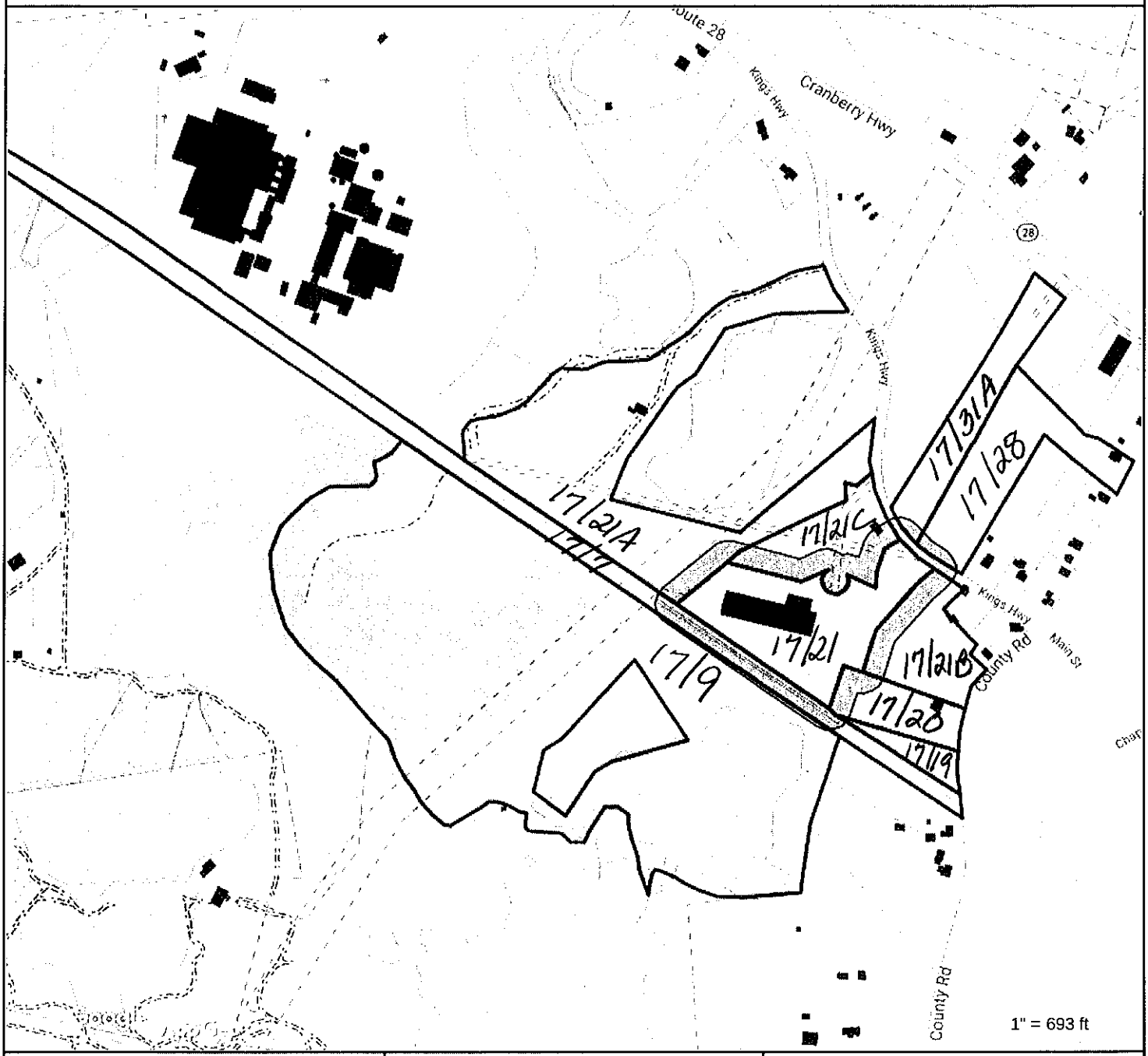
Debra M. Lalli, MAA August 19, 2021
Date

Board of Assessors

45 KINGS HIGHWAY, MAP 17 LOT 21 - 100 FOOT ABUTTERS

MAP/LOT	Site Address	Owner Name	Owner Address	Owner City	STATE	ZIP CODE
17/19	0 COUNTY ROAD	COMMONWEALTH OF MASSACHUSETTS DEPT. OF TRANSPORTATION & CONSTRUCTION	1 ASHBURTON PLACE, ROOM 1610	BOSTON	MA	02108
17/20	519 COUNTY ROAD	WOODWARD, MARK JR.	519 COUNTY ROAD	WEST WAREHAM	MA	02576
17/21A	83 KINGS HIGHWAY	ROCHESTER BITUMINOUS PRODUCTS, INC.	83 KINGS HIGHWAY	WEST WAREHAM	MA	02576-1501
17/21B	0 COUNTY ROAD	TODESCA, ALBERT M. & PAUL A.,TRUSTEES TODESCA REALTY TRUST	83 KINGS HIGHWAY	WEST WAREHAM	MA	02576-1505
17/21C	35 KINGS HIGHWAY	TODESCA, ALBERT M. & PAUL A., TRUSTEES TODESCA REALTY TRUST	83 KINGS HIGHWAY	WEST WAREHAM	MA	02576
17/28	577 COUNTY ROAD	COUTTS, MICHAEL T.	577 COUNTY ROAD	WEST WAREHAM	MA	02571
17/31A	0 KINGS HIGHWAY	TREMONT ENTERPRISE CORP.	P.O. BOX 129	WEST WAREHAM	MA	02576
17/7	0 COUNTY ROAD #RR	COMMONWEALTH OF MASSACHUSETTS DEPT. OF TRANSPORTATION & CONSTRUCTION	100 CAMBRIDGE STREET	BOSTON	MA	02110
17/9	0 COUNTY ROAD	A. D. MAKEPEACE CO.	158 TIHONET ROAD	WAREHAM	MA	02571-1104

45 KINGS HIGHWAY, MAP 17 LOT 21 - 100 FOOT ABUTTERS



Property Information

Property ID	17-21
Location	45 KINGS HIGHWAY
Owner	MASSACHUSETTS, COMMONWEALTH OF

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of Rochester, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 05/14/2021
Data updated 05/14/2021

Print map scale is approximate. Critical layout or measurement activities should not be done using this resource.

TOWN OF ROCHESTER
SCHEDULE OF DEPARTMENTAL
PAYMENTS TO TREASURER

TREASURER ☐
DEPARTMENT ☑
ACCOUNTANT ☐

DEPARTMENT: ASSESSORS

DATE: AUGUST 23, 2021

TREASURER CODE	SOURCE	ACCOUNTANT CODE	AMOUNT
4372	ASSESSORS	01-420-4372	
	COMMONWEALTH OF MASSACHUSETTS		
	MBTA	RCVD. CK #105016	$25.00
	MAP 17 / LOT 21		
	45 KINGS HIGHWAY		
	100 FOOT ABUTTERS LIST		
Solar PILOT/pay as RE Taxes			
Give to TAX COLLECTOR			
		TOTAL SUBMITTED	$25.00

To the officer making the payment and to the Town Accountant:

Received of BETA

the sum of TWENTY-FIVE DOLLARS AND NO CENTS

as per schedule of this date filed in my office.

Debra M. Galli
Signature

Cynthia L Mello
Cynthia L. Mello
Treasurer

8/24/21

Notification to Abutters Under the Massachusetts Wetlands Protection Act

In accordance with the Massachusetts General Laws Chapter 131, Section 40 (the Wetlands Protection Act), you are hereby notified of the following:

1. The applicant's name is **Tess Paganelli (MBTA)**.
2. The applicant has filed the following application with the Rochester Conservation Commission:
   - [X] A Notice of Intent, seeking permission to alter an area subject to protection under the Wetlands Protection Act and/or the Bylaw.
   - [ ] A request to amend an existing Order of Conditions.
   - [ ] A Notice of Resource Area Delineation, seeking to determine the extent of areas subject to protection under the Wetlands Protection Act and/or Bylaw.
3. The address or location of the site where the activity or delineation is proposed is: **45 Kings Highway**, Rochester, MA.
4. The proposed work includes **the construction of a secondary access road, installation of utilities, repaving of bituminous areas, establishment of railroad tracks and storage areas, construction of a retaining wall, construction of wetland and stream replication areas, and implementation of long-term stormwater best management practices.**
5. Copies of the above application may be examined at the Rochester Conservation Commission office, located at the Town Hall Annex, 37 Marion Road, Rochester, between 8:30 a.m. and 4:30 p.m., Monday through Friday. Copies may be obtained at the office for a fee or from the applicant.
6. Information regarding the date, time, and place of the public hearing may be obtained:
   a. By calling the Rochester Conservation Commission Office at 508-763-5421, x3294 between 8:30 a.m. and 4:00 p.m., Monday through Friday or
   b. from the applicant or the applicant's representative.
7. For additional information, please contact the Rochester Conservation Commission at 508-763-5421 ext. 3 or the applicant/applicant's representative whose name is **Jonathan Niro, Environmental Scientist (BETA Group, Inc.)** at **774-573-9694**.

PLEASE NOTE:

1. Notice of the public hearing including its date, time, and place will be published at least five business days in advance in the Wanderer and will be posted at the Rochester Town Hall not less than 48 hours in advance.

Affidavit of Service

Under the Massachusetts Wetlands Protection Act

I, Tyler Drew, hereby certify under the pains and penalties of perjury that on 9/16/2021 I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, section 40, the DEP Guide to Abutter Notification dated April 8, 1994 in connection with the following matter:

A Notice of Intent filed with the Rochester Conservation Commission for the construction of a secondary access road, installation of a water line, repaving of bituminous areas, establishment of railroad tracks and storage areas, construction of a retaining wall, construction of wetland and stream replication areas, and implementation of long-term stormwater best management practices.

The form of notification, and a list of the butters to whom it was given and their addresses, are attached to this Affidavit of Service.

Tyler Drew — 9/16/2021

Name (signature) — Date

Tyler Drew

Name (print)

NARRATIVE

1.0 INTRODUCTION

The Massachusetts Bay Transportation Authority (MBTA) is proposing to improve and increase the storage and servicing capabilities of their facility (the Project) at 45 Kings Highway in Rochester (the Site). The Commonwealth's major railroad maintenance facilities, such as the one present at the Site, were developed to accommodate maintenance, inspections, repairs and storage of the Commuter Rail revenue service fleet. These facilities are unable to provide sufficient capacity in support of the additional demands resulting from equipment procurements, overhauls, and service expansions.

The Site is intended to provide essential support services for Massachusetts Department of Transportation (MassDOT) and MBTA Commuter Rail passenger equipment including procurements, overhauls, and maintenance programs. The anticipated facility improvements will expand these capabilities and is the most expeditious means for supporting these initiatives.

The Site is currently supporting a full load of passenger rail equipment work, including retrofits, acceptance testing, contractor repairs, and special project work. Activities are currently focused on the following mission-critical tasks:

- MassDOT work equipment maintenance and repair;
- MPI new locomotive retrofits;
- Alstom Bi-level overhaul testing and acceptance;
- Kawasaki and Rotem bi-level coach floor repairs;
- Winter resiliency;
- Accident repair; and,
- Existing fleet coach and locomotive heavy repairs and overhaul.

The Site is anticipated to be a key component and resource for the South Coast Rail and Bourne Commuter Rail service expansions. The level of contractor and support effort provided by the Site continues to grow and is anticipated to continue growing given the life cycles of the Commonwealth passenger rail and support equipment. Several facility improvements are required for maintaining the current and anticipated future support requirements, including the addition of tracks both inside and outside of the existing building.

Proposed work associated with the Project includes the following activities:

- Construction of a secondary access road off of Kings Highway;
- Installation of a water line;
- Repaving of bituminous areas;
- Establishment of railroad tracks and storage areas;
- Construction of a retaining wall;
- Mitigation of Resource Area impacts through the replication of Bordering Vegetated Wetland (BVW) and a portion of an intermittent stream channel; and,
- Implementation of long-term stormwater best management practices (BMPs).

The purpose of the Project is to increase the Rochester MBTA facility's capacity to provide critical servicing and storage resources for the South Coast Rail and Bourne Commuter Rail Service, thereby supporting the MBTA's efforts to proactively address ever-increasing servicing needs. Additional track space is essential to the efficacy and success of the passenger coach procurement as the MBTA is anticipating delivery of new equipment beginning March of 2022.

The Project will take place within Areas Subject to Protection and Jurisdiction under the Massachusetts Wetlands Protection Act (M.G.L. ch.131 s.40) and its implementing regulations at 310 CMR 10.00 (collectively "the Act"). Specifically, portions of the Project will result in impacts to Bank and Land Under Water (LUW) associated with an intermittent stream, BVW, and the 100-foot Buffer Zone to BVW. The Project has been designed to minimize and mitigate Resource Area impacts while achieving the Project purpose and is anticipated to fully adhere to the applicable Performance Standards set forth by the Act.

2.0 Site Description

2.1 Project Locus

This Site is located along the western sideline of Kings Highway in Rochester, Massachusetts, approximately 675 feet northwest of the intersection of County Road and Kings Highway (Figure 1 – Site Locus). The Site is bounded to the north by a cranberry bog and utility easement, to the east by Kings Highway, and to the south and west by MBTA railroad tracks. Existing improvements at the Site include a single-story building consisting of office and garage space, bituminous parking areas, storage areas, spur tracks, and undeveloped forest. The forested area to the east consists of a BVW complex and an associated intermittent stream (Figure 2 – Environmental Resources).

2.2 Wetland Resource Areas

A Site visit was conducted by Jacobs' Wetland Scientists on May 16, 2019 to identify and delineate the boundary of existing wetland resource areas on and in the immediate vicinity of the Site. Resource Area boundaries were identified and delineated in accordance with the methods developed by the Massachusetts Department of Environmental Protection's *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act*, dated 1995, as well as definitions set forth in the Wetland Regulations (310 CMR 10.00). On August 10, 2021, a BETA Wetland Scientist visited the Site to reestablish a portion of the BVW flagging and perform a supplemental Resource Area delineation.

State jurisdictional resources areas identified onsite include Bank, Bordering Vegetated Wetland (BVW), Land Under Water (LUW), and Isolated Land Subject to Flooding (ILSF). The boundaries of BVW and ILSF were accepted as part of the issuance of an Order of Conditions (OOC) under DEP File No. 272-0588 on May 15, 2020.

2.2.1 Bank (310 CMR 10.54)

A portion of the Banks associated with an intermittent stream at the eastern extent of the Site were delineated with blue flagging labeled B1-100 to B1-123 (western Bank) and B1-200 to B1-223 (eastern Bank). The intermittent stream is a poorly defined, low-gradient, meandering channel consisting of deep histosols for much of its course. A southerly flow direction was observed adjacent to Kings Highway; however, either stagnant or no water was observed for much of the course of the delineation.

Within the footprint of the Project (south of flags B1-107 and B1-207), the stream becomes well-defined by incised Banks. Vegetation observed along Bank includes sweet pepperbush (*Clethra alnifolia*), red maple (*Acer rubrum*), and sensitive fern (*Onoclea sensibilis*). The stream is approximately five (5) feet wide at this location. During the August 10, 2021 Site visit, BETA observed minimal standing water and no evidence of recent flows (i.e. disturbed leaf litter and recent scour) within the portion of the stream that will be impacted by the Project.

2.2.2 Bordering Vegetated Wetland (310 CMR 10.55)

A portion of the previously approved BVW boundary was reestablished by BETA and consists of pink flagging labeled H-13 through H-36. The BVW is categorized as a palustrine forested wetland complex dominated by vegetation including red maple, sweet pepperbush, silky dogwood (*Cornus amomum*), sensitive fern, greenbrier (*Smilax rotundifolia*), and highbush blueberry (*Vaccinium corymbosum*). U.S. Army Corps of Engineers (USACE) Wetland Field Data Sheets documenting observations of hydrophytic vegetation, hydric soils, and indicators of hydrology are included in Appendix A.

2.2.3 Land Under Water (310 CMR 10.56)

LUW is associated with the intermittent stream at the eastern extent of the Site, between the mean annual low flow levels and along the lower boundary of Bank. LUW consists of deep histosols, leaf litter, and vegetation including sweet pepperbush and sensitive fern. This boundary was not delineated in the field.

2.2.4 Isolated Land Subject to Flooding (310 CMR 10.57)

The previously approved ILSF boundary is located to the west of the proposed access road. The ILSF is identified by the "L-Series" flagging and is categorized as an isolated, depressional forested wetland complex consisting of vegetation including red maple and sweet pepperbush. USACE Wetland Field Data Sheets documenting observations of hydrophytic vegetation, hydric soils, and indicators of hydrology are included in Appendix A.

2.3 Buffer Zones

Portions of the Project are located within the 100-foot Buffer Zone to BVW. Buffer Zone presently consists of undeveloped upland forest, gravel areas, and cleared areas. Portions of the Buffer Zone at the Site were restored pursuant to an OOC issued under DEP File No. 272-0588. The Conservation Commission voted to issue a full Certificate of Compliance for this work at the September 7, 2021 hearing.

2.4 NHESP-Mapped Habitat and Other Sensitive Areas

According to the latest MassGIS data, the Site is not located within Natural Heritage and Endangered Species Program (NHESP) Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife; the closest NHESP mapped habitats (PH 500 and EH 428) are located approximately 1,500 feet southwest of the Site. The Site is also not located within an Areas of Critical Environmental Concern (ACEC), within 200 feet of mapped Certified or Potential Vernal Pool, or within groundwater or surface water protection zones associated with a public water supply.

3.0 Work Description

Construction of the Project will involve work within Areas Subject to Jurisdiction and Protection Under the Act including Bank, BVW, and LUW. It is anticipated that work will be performed by an MBTA on-call contractor. Since the Project phasing is largely driven by availability of funding, facets of the Project may occur over the course of multiple years. The erosion and sediment control plan discussed in Section 4.1 provides provisions for temporary stabilization of exposed areas of the Site that become dormant.

There will be close oversight of the work by a MA Registered Professional Engineer and other relevant professionals to ensure that the impacts and scope of work described herein are not exceeded and that the ability of the Areas Subject to Protection to protect the interests of the Act are not adversely affected.

3.1 WORK WITHIN JURISDICTIONAL RESOURCE AREAS

3.1.1 BANK (310 CMR 10.54)

The Project will involve the construction of a retaining wall within the eastern portion of the Site to accommodate expanded track and storage areas. Approximately 110 linear feet of Bank (55 linear feet on each side of the stream) will be permanently impacted to establish a five (5)-foot-wide work area for the construction of the retaining wall. More specifically, this includes the excavation and backfill required to install the piles. Section 4.4 of this NOI provides further details on the relocation of this portion of the stream.

All work resulting in Bank impacts will be performed from the west side of the stream, within areas of BVW slated to be filled. By staging work from this area and demarcating the perimeter of the work area with effective erosion controls as detailed in Section 4.1, additional impacts to Bank outside of the Project area (such as compaction from equipment access) will be avoided.

3.1.2 BORDERING VEGETATED WETLAND (310 CMR 10.55)

The Project will result in a total of 4,240 square feet of BVW impact, 1,240 square feet of which is temporary. BVW impacts will occur within three (3) areas and are associated with the proposed facility expansion, construction of the retaining wall, and the stream replication.

A five (5)-foot-wide work zone will be established from the edge of the proposed retaining wall and demarcated with the approved erosion control measures. All limits of work will be staked in the field by conventional survey methods. The contractor will work to grade and fill this area from east to west and will be restricted to the approved limits of work. Excavation will then be performed to install the retaining wall piles; any dewatering that is required will be performed in accordance with the methods described in Section 4.5 of this NOI narrative.

Once the piles are installed and the gravel base is established, the concrete base pads will be established. At this point, and prior to achieving the final grade of the new storage and track area, machinery will be staged within the permanently impacted BVW to excavate the new stream channel. Prior to excavation, the new stream channel will be staked in the field by conventional survey methods and siltation fencing will be installed along the proposed eastern Bank and the adjacent BVW. Hydric soils from the stream channel excavation and BVW impact areas, where available, will be stored onsite under a tarp and kept moist until their eventual reuse within the BVW replication areas. Should final hand-shaping of the stream channel be required, workers will be instructed to avoid traversing through unaltered BVW.

All BVW impacts will be fully mitigated through the construction of replications areas exceeding the total area of BVW impacted by the Project. Erosion controls associated with the BVW replication areas will be installed directly along the existing BVW boundary and are not anticipated to result in additional temporary impacts to BVW. Further details relevant to BVW replication is provided in Section 4.3

Table 1 describes and categorizes proposed impacts to BVW that will result from the Project:

Table 1: BVW Impact Descriptions

LOCATION	IMPACT TYPE	IMPACT DESCRIPTION	IMPACT AREA (SF)
Between BVW flags H-20 and H-23	Permanent	Construction of a retaining wall and establishment of impervious areas.	2,440
Between BVW flags H-20 and H-23	Temporary	Establishment of a five (5)-foot-wide work area.	775
Between BVW flags H-11 and H-13	Permanent	Construction of a retaining wall.	135
Between BVW flags H-11 and H-13	Temporary	Establishment of a five (5)-foot-wide work area.	345
Stream Replication Area	Permanent	Excavation of a stream channel to replicate permanently impacted Bank and LUW.	425
Stream Replication Area	Temporary	Installation of erosion control associated with the excavation of the stream channel.	120
		PERMANENT BVW IMPACTS = 3,000 SF	
		TEMPORARY BVW IMPACTS = 1,240 SF	
		TOTAL BVW IMPACTS = 4,240 SF	

3.1.3 Land Under Water (310 CMR 10.56)

The construction of the retaining wall within the eastern portion of the Site will result in filling approximately 110 linear feet of an intermittent stream, which will include the loss of approximately 550 square feet of LUW. It is not anticipated that surface waters will be encountered during this work, as the stream exhibits signs of minimal intermittent flow throughout an average year. Regardless, a compost filter tube will be laid across the streambed on both the upstream and downstream side of the work area to prevent sedimentation within LUW outside of the Project footprint.

The work approach for the construction of the retaining wall will occur as discussed in Sections 3.1.1 and 3.1.2 of this NOI.

3.2 Work in Buffer Zones

Portions of the Project are proposed within the 100-foot Buffer Zone to BVW and Bank and include the following activities:

- Construction of a new 30-foot-wide bituminous access roadway with gravel shoulders intended for storage operations;
- Installation of a water main under the new access roadway;
- Installation of an electrical service line and associated utility poles;

- Mill and overlay of an existing bituminous parking area;
- Construction of new impervious areas for storage and facility operations;
- Construction of six (6) new sets of tracks; and,
- Construction of long-term stormwater management features.

Prior to the commencement of these activities, the forested areas within the limits of work will be cleared, stumped, and rough graded. Erosion control barriers consisting of a 12-inch compost filter tube and siltation fencing entrenched to a minimum depth of six (6) inches will be installed along the limits of work to prevent sediment migration into adjacent Resource Areas. In addition, as detailed in Section 4.2, the long-term stormwater runoff associated with new impervious areas within Buffer Zone will be managed through the construction of a stormwater management system that meets or exceeds the MassDEP Stormwater Management Standards.

Table 2 below details the impacts anticipated within Buffer Zone.

Table 2: Buffer Zone Impact Summary*

ACTIVITY	AREA OF IMPACT (SF)	AREA OF NEW IMPERVIOUS (SF)
Clearing of vegetation	84,650	0
Expansion of paved areas	60,824	60,824
Mill and overlay of existing paved areas	1,627	0
Construction of a stormwater basin	229	0
Placement of new ballast	1,694	0
TOTAL AREA OF BUFFER ZONE = 102,432 SF **NEW IMPERVIOUS WITHIN BUFFER ZONE = 60,824 SF**		

**Many of these impact areas overlap; therefore, the sum of these impacts areas are greater than the total Buffer Zone impacts at the Site.*

4.0 Mitigation Measures

4.1 Erosion and Sedimentation Controls

BMPs for erosion and sedimentation control will be adhered to for all phases of construction to minimize erosion, sedimentation, and impacts on Resource Areas. Sheets C-211 and C-212 of the plan in Appendix B depicts the locations of proposed erosion controls.

Erosion control measures will be implemented along the limit of work downgradient of the disturbed areas during construction to minimize water quality impacts to adjoining Resource Areas. Erosion and sedimentation barriers, consisting of 12-inch compost filter tubes and entrenched siltation fencing will be installed to reduce the chance of soil migration under and beyond the sedimentation barrier. The existing

erosion control barriers present at the Site will be inspected prior to the commencement of work and may be repaired and reused if warranted by their condition. Erosion control measures will also be installed upgradient of the wetland replication areas and around the proposed stormwater basins to prevent sedimentation throughout the course of the Project. In addition, all catch basins located at the Site will be protected with silt sacs.

Stockpiling of materials including soils, vegetation, and steel is anticipated to occur at the Site. All stockpiles will be surrounded with 12-inch compost filter tubes to prevent the migration of any sediment or loose materials. Any soils stockpiled at the Site (i.e. hydric soils for later reuse) will be covered with a tarp.

Temporarily impacted areas will be stabilized following the completion of the Project. Areas of exposed soil, including those resulting from temporarily dormant construction phases, will be covered with loam and an approved, native seed mixture[1]. Erosion controls will remain in place and in proper working order until the Site is completely stabilized. A stockpile of erosion control materials will be onsite at all times for emergency and routine replacement.

4.2 Stormwater Management

According to the Massachusetts Stormwater Management Standards (310 CMR 10.05(6)(k-q) – the Standards), the portion of the proposed work involving repaving of an existing bituminous area constitutes a Redevelopment Project. Redevelopment projects are required to meet the Standards 1 and 7 through 10 fully and Standards 2 through 6 only to the maximum extent practicable but must at least improve existing conditions. Runoff associated with redevelopment will be managed by a detention basin that will provide runoff treatment and attenuation that does not exist at the Site today.

The majority of the Project, however, including the construction of the access road and expansion of impervious areas, would be considered new development and therefore must comply fully with the Standards. Stormwater management BMPs associated with the new development areas includes construction of a detention basin, deep sump catch basins, swales, and ballast stone filters. These BMPs have been designed and sized to treat a water quality volume of one (1) inch.

The Stormwater Management Report included in Appendix C provides calculations and a summary of the Project's compliance with the Standards.

4.3 BVW Replication and Restoration

The plans in Appendix B depict the proposed BVW replication and restoration that will occur as part of the Project. The Project proposes two (2) replication areas that provide a total of 4,240 square feet of BVW to mitigate the permanent loss of 3,000 square feet of BVW. The replication areas will provide a combination of woody and herbaceous species that were observed in the surrounding area; however, in support of the long-term structural stability of the retaining wall, shrubs should be planted at least five (5) feet from the edge of the wall and trees should be set back a distance of least ten (10) feet. A native, wet-tolerant seed mix[2] will be applied within the replication areas as well. Hydric soils excavated from

[1] Seed mix will be comparable to the New England Wetland Plants Erosion Control/Restoration Mix for Dry Sites and include species such as Red Fescue (Festuca rubra), Canada Wild Rye (Elymus canadensis), Annual Ryegrass (Lolium multiflorum), Perennial Ryegrass (Lolium perenne), Little Bluestem (Schizachyrium scoparium), Indian Grass (Sorghastrum nutans), Switch Grass (Panicum virgatum), and Upland Bentgrass (Agrostis perennans).

[2] Seed mix will be comparable to the New England Wetland Plants Wet Mix and include species such as Fox Sedge (Carex vulpinoidea), Lurid Sedge (Carex lurida), Blunt Broom Sedge (Carex scoparia), Blue Vervain (Verbena

impacted BVW will be reused to the extent feasible; however, hydric soil amendments may be required and shall consist of 10-12% organic matter by dry weight and be free of rocks greater than four (4) inches in diameter. The proposed replication areas will be marked in the field following grading to prevent compaction.

1,240 square feet of temporarily impacted BVW, such as the work areas adjacent to the retaining wall, will be restored in-place following construction of the retaining wall. Due to the proximity of this area to the wall, restoration will consist of the application of a native, wet-tolerant seed mix.

The following protocol will generally be followed for the construction of the replication areas and the implementation of in-place restoration:

i. Stake the BVW replication areas in the field in anticipation of their grading. Onsite personnel will be instructed to prevent compaction in these areas to the extent feasible.

ii. Begin construction of the retaining wall and continue until the concrete wall base is in place.

iii. Once the concrete base is in place, stage machinery within the developed area(s) to reach over the wall and establish the grade of the replication areas. The area will be over excavated by twelve (12) inches to facilitate placement of hydric soils. The contractor will perform as much of this work as possible by hand and will coordinate with the onsite engineer and Rochester Conservation Commission Agent to limit the use of machinery to the extent feasible.

iv. Remove all unsuitable soils from the replication area. Place a twelve (12)-inch thick layer of hydric soils consisting of either suitable onsite borrow or offsite amendments. Place cut trees and brush from clearing activities in random locations throughout the replication area for wildlife habitat as directed by the onsite engineer.

v. Immediately establish upgradient erosion controls and seed the replication areas with the approved seed mix. Should seeding not be sufficient in stabilizing the area due to the time of year, straw mulch free of seed heads will be spread over the replication area. Seeding shall occur as soon as favorable growing conditions are present.

vi. If work to establish the retaining wall and replication areas occurs during the growing season, plantings will be placed in replication areas and installed. Should this not be feasible due to the time of year, the contractor will be required to lower plantings into the replication areas from the top of the constructed wall at the beginning of the next growing season. At no point will heavy machinery enter the replication areas.

vii. Monitor the replication areas for successful vegetative establishment. Monitoring reports shall be prepared by a qualified professional and submitted twice per year for two (2) years; the first report is to be submitted no later than June 1st of any given year and the second report is to be submitted to later than November 1st of any given year. These reports will include details on observed hydrology, development of soils, establishment of at least 75 percent cover of native hydrophytic vegetation, and signs of wildlife.

hastata), Fowl Bluegrass (Poa palustris), Hop Sedge (Carex lupulina), Green Bulrush (Scirpus atrovirens), Creeping Spike Rush (Eleocharis palustris), Fringed Sedge (Carex crinita), Soft Rush (Juncus effusus), Spotted Joe Pye Weed (Eupatorium maculatum), Rattlesnake Grass (Glyceria canadensis), Swamp aster (Aster puniceus), Blueflag (Iris versicolor), Swamp Milkweed (Asclepias incarnata), and Square stemmed Monkey Flower (Mimulus ringens).

A robust native planting plan is proposed within the replication areas and is anticipated to provide soil stabilization and wildlife habitat. A list of species and their quantities can be found on the replication plans in Appendix B.

4.4 Intermittent Stream Replication

An approximately 110-linear foot portion of an intermittent stream channel will require relocation to accommodate the proposed retaining wall. Although this portion of the stream does not exhibit indicators of frequent flow such as scour and water-staining, the replicated stream will tie into upstream and downstream grades to establish positive flow. Existing Banks are well-established with vegetation such as sweet pepperbush; however, a dense stand of sweet pepperbush is located east of the stream and is anticipated to provide adequate coverage over the new Banks. Importing a simulated stream substrate is not anticipated due to the existing substrate consisting of organic soils and leaf litter. Therefore, this substrate will be replicated using onsite materials. Generally, the following work procedures will be followed when performing the stream replication work:

i. Stake the stream replication area in the field and install erosion control measures where the new Bank and adjacent BVW interface.

ii. Begin construction of the retaining wall and continue until the concrete wall base is in place.

iii. Once the concrete base is in place, stage machinery within the developed area(s) to reach over the wall and establish the Banks and streambed of the new stream channel.

iv. Meet existing grades at both the upstream and downstream end of the streambed and establish a consistent slope between them. Tie the slopes and grades of the newly constructed Banks into the existing Banks. New Banks shall be consistent with slopes and grades of adjacent Banks. The new segment of stream shall match the width and depth of the impacted portion of stream.

v. Install biodegradable netting over the Banks and streambed. Spread onsite leaf litter over the streambed to simulate conditions within the impacted stream.

vi. Immediately seed the Banks with the approved seed mix. Should this work occur outside of the growing season, straw mulch free of seed heads will be spread over the biodegradable netting on Bank.

vii. Monitor the area for successful vegetative establishment and stabile conditions. Monitoring reports shall be prepared by a qualified professional and be submitted twice per year for two (2) years; the first report is to be submitted no later than June 1st of any given year and the second report is to be submitted to later than November 1st of any given year. The report shall detail the germination of applied seed mix, signs of hydrology, and stabilization of Banks.

4.5 Dewatering

Dewatering of groundwater is anticipated to occur during the installation of the retaining wall piles. If groundwater is encountered, a sump will be installed within the excavated hole and connect to a hose and pump that will temporarily lower the local groundwater level. Due to the constraints presented by the spatial extent of proposed work and the locations of Resource Areas at the Site, it is anticipated that dewatering discharges will be directed to a mobile frac tank for treatment prior to discharge over an upland area. If warranted, sediment-filtering bags will be placed downgradient of the frac tank for further filtration prior to overland discharge. The exact location of dewatering discharge may vary throughout the course of the Project due to the spatial extent of the work; however, it is anticipated that discharges will be directed to the south of the existing building prior to the construction of both sets of tracks. This area

consists of upland outside of the Buffer Zone and an existing depression that would serve as a means to collect and infiltrate groundwater discharges. The siting of dewatering discharges will be a constant consideration throughout the Project and will involve coordination between the onsite engineer, the contractor, and the Conservation Commission to ensure that discharges near Resource Areas are free of sediment.

5.0 ALTERNATIVES ANALYSIS

Under the Act, projects are required to avoid, minimize, and mitigate impacts to Areas Subject to Protection. To that end, an Alternatives Analysis has been prepared to demonstrate that the Project follows this procedure in light of the Project purpose. The Project purpose is to increase the Rochester MBTA facility's capacity to provide critical servicing and storage resources for the South Coast Rail and Bourne Commuter Rail Service. To evaluate Project alternatives as they relate to this purpose, the following criteria has been established:

- Effect of the alternative on the safety of MBTA workers and passengers;
- Environmental impact of the alternative;
- Cost of the alternative; and
- The efficacy of the alternative in maintaining ever-increasing servicing volumes.

The intent of this Alternatives Analysis is to demonstrate that the Preferred Alternative has been selected based on a balance of the above-referenced criteria while accomplishing the Project purpose and meeting the applicable General Performance Standards.

Alternative #1: No Action/No Build

Alternative #1 would result in no impacts to the environment and would not require any up-front construction costs from the MBTA. However, this alternative would be fatal to the MBTA's ability to maintain ever-increasing servicing volumes. The Site is currently under-equipped to handle the current storage and servicing needs – a situation that would worsen upon the delivery of new equipment as early as March of 2022. These impacts on storage and servicing operations would be detrimental to the public, as the MBTA would not be able to adequately address the critical servicing projects required to maintain a safe transportation service for its users. Therefore, this alternative does not meet the Project purpose and was abandoned.

Alternative #2: Alternative Location Selection

Consideration was given to implementing the Site improvements within an area of the Site that would not result in BVW impacts. However, to incorporate the new service tracks with the existing maintenance garage, this was not achievable. The placement of the new tracks is dictated by the location of the existing spur tracks. In addition, in order to provide appropriate structural support to these new tracks and their anticipated storage weight, the retaining wall must be constructed where it is presently proposed.

Consideration could also be given to upgrading other facilities. However, the Rochester MBTA facility serves a wide geographic region and is required to accommodate delivery of new equipment as early as March 2022. Additionally, it cannot reasonably be ensured that other facilities do not have similar constraints that would result in environmental impacts associated with development. Therefore, this alternative does not meet the Project purpose and was abandoned.

Alternative #3: Alternative Construction Method – Graded Slopes

Alternatives #1 and #2 establish the need and justification for development within the eastern portion of the Site in order to meet the goals of the Project.

One alternative method of construction that was considered is the establishment of graded side slopes (in lieu of a retaining wall) up to a paved area. This method of construction would not require the excavation or dewatering associated with installing the retaining wall piles. In addition, this would be a less costly design for the MBTA to construct. However, to establish safe and stable slopes that do not require a retaining wall, this alternative would either result in BVW impacts possibly exceeding the allowable 5,000 square feet or a reduction in storage/servicing space. Since this alternative would either result in avoidable BVW impacts or fail to meet the Project purpose, it was abandoned.

Alternative #4: Alternative Construction Method – Pier-Supported Storage/Servicing Area

Another alternative construction method that could potentially be implemented is a pier-supported structure. Permanent impacts to BVW would be limited to the footprint of the piers; however, a significant amount of temporary impacts possibly exceeding the allowable 5,000 square feet would be required to establish work areas associated with installing the piers. The cost of a pier-supported structure would also make this alternative infeasible for the MBTA to undertake. While this alternative would result in meeting the Project purpose, the associated cost combined with the environmental impacts resulted in the abandonment of this alternative.

Alternative #5: Construction of a Retaining Wall (Preferred Alternative)

The Preferred Alternative is the Project as presented in this NOI, which includes the construction of a retaining wall to support an expansion of usable space at the Site for equipment servicing and storage. This design choice balances a reasonable cost with the accomplishment of the Project purpose and is anticipated to provide the greatest level of service to the South Coast Rail and Bourne Commuter Service. The extension of the tracks associated with the existing maintenance building will increase service capacity and provide safer, more reliable equipment for the public. To the south of the building, the additional storage tracks will provide the MBTA with the space to accommodate soon-to-arrive equipment and resources critical to operations. Since this area is presently used as storage for non-track-mounted materials and equipment, establishment of new storage areas within 25 feet of BVW and IVW will be required near Kings Highway. Avoidance of alterations within 25 feet of Resource Areas would result in a decrease in storage capabilities elsewhere onsite; therefore, the Project cannot reasonably site all work outside of this 25-foot setback and accomplish the Project goal.

The Project will mitigate all Resource Areas impacts in accordance with the applicable Performance Standards set forth by the Act. Resource Area impacts have also been minimized through the wall design; impacts to BVW have been limited to what is required to install the lengths of track. In addition, all stormwater runoff associated with the new impervious areas will be treated in accordance with the MassDEP Stormwater Management Standards. Therefore, this iteration of the Project satisfies the Project purpose while balancing each facet of the criteria established for assessing alternatives.

6.0 REGULATORY COMPLIANCE

The Project has been designed to fully meet the Performance Standards set forth by the Act for Bank, BVW, and LUW.

6.1 MASSACHUSETTS PROTECTION ACT REGULATIONS - 310 CMR 10.00

6.1.1 BANK GENERAL PERFORMANCE STANDARDS COMPLIANCE

The Performance Standards at 310 CMR 10.54(4)(a) 1 through 5[3] will be fully met by the Project. The provisions of 310 CMR 10.54(a)(a)6. are not applicable, as the Project does not involve a stream crossing.

The Project will ensure the physical stability of Bank by stabilizing the new Banks with biodegradable nettings and applying a wetland seed mix. Germination of the seed mix combined with maintaining existing woody vegetation will allow root systems to establish and provide support to the Banks. The water carrying capacity of the channel will also be maintained by providing a width of four (4) to five (5) feet between Top of Banks and matching the slopes of the adjacent Banks. Groundwater and surface water quality is anticipated to remain unaffected, as the Banks will be fully stabilized and constructed to accommodate the hydrology present at the Site. As an intermittent stream that appears to be dry for most of the year, presence of fish is not expected. However, the herbaceous cover proposed along Bank will maintain any breeding habitat, escape cover, and food source that is currently present.

The Project is subject to an Appendix B Wildlife Habitat Evaluation due to Bank impacts that exceed 100 linear feet. A completed Appendix B form and associated narrative is included in Appendix D of this NOI. The Wildlife Habitat Evaluation generally found that impacts to Bank and its capacity to provide wildlife habitat functions will be mitigated by the replication of the stream channel that mirrors the conditions of the impact area.

6.1.2 BVW GENERAL PERFORMANCE STANDARDS COMPLIANCE

The Project has been designed to comply with the Performance Standards at 310 CMR 10.55(4)(b) 1 through 7[4].

The Project proposes to construct wetland replication areas totaling 4,240 square feet in area for 3,000 square feet of permanent impact, which exceeds the 1:1 replacement-to-impact ratio requirement of the

[3] 310 CMR 10.54(a): Where the presumption set forth in 310 CMR 10.54(3) is not overcome, any proposed work on a Bank shall not impair the following: 1. the physical stability of the Bank; 2. the water carrying capacity of the existing channel within the Bank; 3. ground water and surface water quality; 4. the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries; 5. the capacity of the Bank to provide important wildlife habitat functions.

[4] 310 CMR 10.55(4)(b): Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5000 square feet of Bordering Vegetated Wetland when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost: 1. the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area"); 2. the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area; 3. The overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area; 4. the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area; 5. the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area; 6. at least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods; and 7. the replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00.

Act. In addition, the 1,240 square feet of temporary impact will be restored in place. Since the areas of temporary impact will be adjacent to the retaining wall and preclude the planting of deep-rooted woody vegetation, these areas will be restored solely with herbaceous vegetation; therefore, these areas have been conservatively factored into the total area of forested and scrub-shrub wetland replication in addition to being restored in-place.

The replication areas have been sited to the west of the intermittent stream within close proximity to the impacted areas. The areas selected for replication are located within the same reach as the intermittent stream and do not present any hydraulic restrictions. In addition, the replication areas will be established between elevations 67 feet and 69 feet (NAVD88), which is consistent with the impacted area elevations of 66 feet to 69 feet (NAVD88). The replication areas will be revegetated with at least 75 percent coverage of native hydrophytic plant species over two (2) growing seasons and stabilized in the interim through the application of a native wetland seed mix as detailed in Section 4.3 and on the plans in Appendix B.

Since these replication areas will be sited within upland Buffer Zone, the Performance Standard at 310 CMR 10.55(4)(b)7. is not applicable.

6.1.3 LUW General Performance Standards Compliance

The Project will meet the Performance Standards at 310 CMR 10.56(4)(a) 1 through 4[5]. 310 CMR 10.55(4)(a)5. is not applicable to the Project, as no stream crossings are proposed.

By maintaining a streambed width consistent with the width of the impacted portion of the stream, the Project will not impair the water carrying capacity of the stream. Once the new portion of stream is constructed, both the Banks and the area between them (LUW) will be stabilized with biodegradable netting, and onsite leaf litter will be spread over the streambed to simulate existing conditions within the impacted portion of the stream. These measures will prevent immediate migration of sediment within the stream and thereby support protection of surface and ground water quality. This stream does not appear to support fish; however, the Project will comply with the protection of fisheries Performance Standard by providing a streambed that matches existing conditions. The Project will not exceed LUW impact thresholds for a wildlife habitat evaluation and therefore is presumed to meet the wildlife habitat Performance Standard for LUW.

6.2 Town of Rochester Wetlands Protection Bylaw – Section XV

Due to its enabling legislation, the MBTA is not subject to local bylaws and ordinances. However, efforts have been made, where feasible, to demonstrate compliance with the Bylaw 25-foot No Disturb Zone. The No Disturb Zone has been depicted on the plans in Appendix B for the benefit of the Conservation Commission's review.

The Project includes impacts to Resource Areas and will inherently involve work within 25 feet of Resource Area. However, efforts were made during the design process to preserve portions of the No Disturb Zone. Specifically, the areas planted with woody vegetation near Kings Highway under DEP File No. 272-0588 will be preserved as restored Buffer Zone. Additionally, while impacts to the No Disturb Zone include the

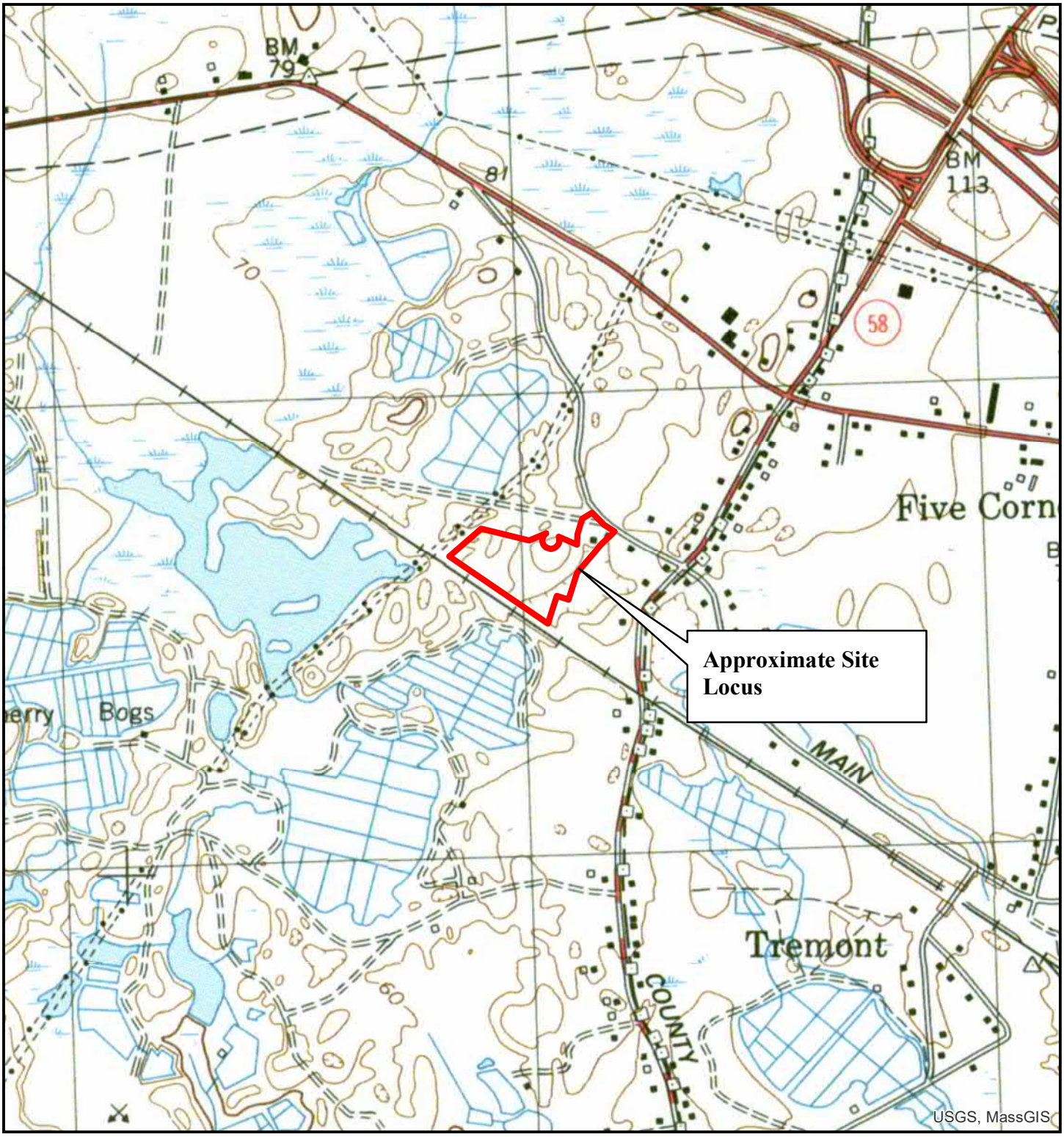
[5] 310 CMR 10.55(4)(a): Where the presumption set forth in 310 CMR 10.56(3) is not overcome, any proposed work within Land under Water Bodies and Waterways shall not impair the following: 1. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks; 2. Ground and surface water quality; 3. The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and 4. The capacity of said land to provide important wildlife habitat functions.

construction of storage areas, they also include the establishment of wetland replication areas which will become densely vegetated with native herbaceous and woody species.

7.0 SUMMARY

The Project Team feels that the Conservation Commission has been provided with sufficient information to describe the Site, the work, and the effects of the work on the adjacent Resource Areas, and respectfully requests the issuance of an Order of Conditions approving the Project.

Figures



BETA
IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
45 Kings Highway
Rochester, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Map
45 Kings Highway
Rochester, MA

Approximate Project Locus

Wetland Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- Area of Critical Environmental Concern (ACEC)
- Zone A
- Zone B
- Outstanding Resource Water
- MassDEP IWPA
- MassDEP Zone I
- MassDEP Zone II

Mapped Habitat Legend

- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

N
W E
S

0 500 1,000 Feet

1 inch = 500 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

BETA
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National Flood Hazard Layer FIRMette

FEMA

70°47'7"W 41°48'3"N

70°46'30"W 41°47'37"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/12/2021 at 2:29 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Photographic Documentation

Photo 1

View of the intermittent stream at flag B1-216—facing north.

Photo 2

View of the intermittent stream at flag B1-217—facing south.

PHOTOGRAPHIC DOCUMENTATION

45 Kings Highway Site Visit

Rochester, Massachusetts

Photographs Documented August 10 & September 7, 2021

Photo 3

View of the intermittent stream within the northern extent of the impact area at flag B1-115; standing water is due to a preceding rain event exceeding 5 inches—facing south.

Photo 4

View of the recently restored Buffer Zone—facing south.

PHOTOGRAPHIC DOCUMENTATION

45 Kings Highway Site Visit

Rochester, Massachusetts

Photographs Documented August 10 & September 7, 2021

Photo 5

View of forested BVW at the Site—facing west.

Photo 6

View of partially forested upland at the Site near the railroad tracks—facing south.

PHOTOGRAPHIC DOCUMENTATION

45 Kings Highway Site Visit

Rochester, Massachusetts

Photographs Documented August 10 & September 7, 2021

APPENDIX A – USACE Wetland Field Data Sheets

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester/Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 1

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: 41.799174 Long: -70.786351 Datum: NAD83

Soil Map Unit Name: 255B-Windsor loamy sand, 3-8% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal (http://www.nrcc.cornell.edu/regional/monthly/monthly.html).

Flag A3 located at culvert headwall.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

X Surface Water (A1)	____ Water-Stained Leaves (B9)	____ Aquatic Fauna (B13)
X High Water Table (A2)	____ Marl Deposits (B15)	X Hydrogen Sulfide Odor (C1)
X Saturation (A3)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Presence of Reduced Iron (C4)
____ Water Marks (B1)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Thin Muck Surface (C7)
____ Sediment Deposits (B2)	____ Other (Explain in Remarks)	
____ Drift Deposits (B3)		
____ Algal Mat or Crust (B4)		
____ Iron Deposits (B5)		
X Inundation Visible on Aerial Imagery (B7)		
____ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

____ Surface Soil Cracks (B6)
X Drainage Patterns (B10)
____ Moss Trim Lines (B16)
____ Dry-Season Water Table (C2)
____ Crayfish Burrows (C8)
X Saturation Visible on Aerial Imagery (C9)
____ Stunted or Stressed Plants (D1)
____ Geomorphic Position (D2)
____ Shallow Aquitard (D3)
____ Microtopographic Relief (D4)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches):	6
Water Table Present?	Yes X	No ____	Depth (inches):	-
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches):	-

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 1

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	40	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Clethra alnifolia*	50	Yes	FAC
2. *Acer rubrum*	40	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	90	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron radicans*	3	No	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	3	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Muck	
4-18	10YR 3/3	70	10YR 2/1	30	C	M	Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- X Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester/Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 2

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: 41.799487 Long: -70.786086 Datum: NAD83

Soil Map Unit Name: 255C-Windsor loamy sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 2

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Rosa multiflora*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron radicans*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	15 (A)		55 (B)
Prevalence Index = B/A =			3.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
N/A								Railroad Ballast, refusal at grade

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester/ Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 3

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: 41.799061 Long: -70.785375 Datum: NAD83

Soil Map Unit Name: 255B-Windsor loamy sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Eastern White Pine	45	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	45	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Rosa multiflora*	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron rydbergii*	20	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	20	x 3 =	60
FACU species	75	x 4 =	300
UPL species	0	x 5 =	0
Column Totals:	95 (A)		360 (B)
Prevalence Index = B/A =			3.79

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					Sandy	
2-4	2.5YR 3/1	100					Sandy	
4-18	10YR 5/8	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 4

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield fine sandy loam, 3-8% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 9
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 3

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 4

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2. *Quercus rubra*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Clethra acuminata*	55	Yes	UPL
2. *Vaccinium boreale*	35	Yes	UPL
3. *Vaccinium angustifolium*	5	No	FACU
4.			
5.			
6.			
7.			
	95	=Total Cover	
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	20	x 4 =	80
UPL species	90	x 5 =	450
Column Totals:	125 (A)		575 (B)
Prevalence Index = B/A =			4.60

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100					Sandy	
3-8	10YR 4/1	97	10YR 3/6	3			Sandy	
8-18	10YR 2/1	90	10YR 4/4	10			Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 5

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield loamy fine sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 5

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus resinosa*	5	Yes	FACU
2. *Pinus strobus*	5	Yes	FACU
3. *Quercus rubra*	10	Yes	FACU
4.			
5.			
6.			
7.			
	20	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					sandy	refusal after 4", railroad ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 6

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 253C-Hinckley loamy sand, 8-15% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	Wetland C	

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 12

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 6

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Betula papyrifera*	25	Yes	FACU
2. *Acer rubrum*	20	Yes	FAC
3. *Pinus strobus*	15	Yes	FACU
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Clethra alnifolia*	60	Yes	FAC
2. *Vaccinium corymbosum*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	75	=Total Cover	
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Mucky Sand	
4-12	10YR 4/2	90	10YR 5/6	10	C	M	Sandy	
12-18	10YR 3/3	95	10YR 5/6	5			Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ? Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 7

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 253B-Hinckley loamy sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Toe of slope at edge of RR embankment

VEGETATION – Use scientific names of plants. Sampling Point: 7

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	45	Yes	FACU
2. *Acer saccharum*	5	No	FACU
3.			
4.			
5.			
6.			
7.			
	50	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Rosa multiflora*	30	Yes	FACU
2. *Clethra acuminata*	25	Yes	UPL
3.			
4.			
5.			
6.			
7.			
	55	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron radicans*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1. *Smilax*	15	Yes	FAC
2.			
3.			
4.			
	15	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	25	x 3 =	75
FACU species	80	x 4 =	320
UPL species	25	x 5 =	125
Column Totals:	130 (A)		520 (B)
Prevalence Index = B/A =			4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/4	100					Sandy	refusal after 3 inches, railroad ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 8

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 253C-Hinckley loamy sand, 8-15% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	Wetland D	

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 8

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Iethra alnifolia*	35	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	35 =Total Cover		
Herb Stratum (Plot size: 5')			
1. *Spiraea tomentosa*	45	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45 =Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	45	x 2 =	90
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		195 (B)

Prevalence Index = B/A = 2.44

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/1	100					Mucky Sand	
5-8	10YR 4/2	100					Sandy	
8-18	10YR 4/1	95	10YR 2/1	5	RM	M	Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 9

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield loamy fine sand, 3-8% slopes NWI classification: PFO1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	Wetland E	

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____		
Water Table Present?	Yes X	No ____	Depth (inches): 12		
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 3	**Wetland Hydrology Present?**	**Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 9

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	60	Yes	FAC
2. *Pinus strobus*	15	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	75	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer saccharinum*	40	Yes	FACW
2. *Acer rubrum*	30	Yes	FAC
3. *Iethra alnifolia*	30	Yes	FAC
4.			
5.			
6.			
7.			
	100	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Onoclea sensibilis*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10	=Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/1	100					Mucky Sand	
3-9	10YR 4/2	90	10YR 5/6	5			Sandy	
9-18	10YR 4/3	95	10YR 3/4	5			Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 10

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield loamy fine sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

Remarks:
Toe of slope at edge of RR embankment

VEGETATION – Use scientific names of plants.

Sampling Point: 10

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2. *Pinus strobus*	10	No	FACU
3. *Quercus rubra*	15	Yes	FACU
4.			
5.			
6.			
7.			
	65	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron radicans*	30	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1. *Celastrus orbiculatus*	15	Yes	UPL
2. *Smilax*	15	Yes	FACU
3.			
4.			
	30	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	70	x 3 =	210
FACU species	40	x 4 =	160
UPL species	15	x 5 =	75
Column Totals:	125 (A)		445 (B)

Prevalence Index = B/A = 3.56

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/4	100					sandy	refusal after 6 inches, railroad ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 15

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield loamy fine sand, 3-8% slopes NWI classification: PFO1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	Wetland H	

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 15

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	35	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	35	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Clethra alnifolia*	55	Yes	FAC
2. *Acer rubrum*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	75	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Toxicodendron radicans*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15	=Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	125	x 3 =	375
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	125 (A)		375 (B)
Prevalence Index = B/A =			3.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/2	100					Mucky Sand	
5-18	10YR 4/2	85	10YR 5/6	15	C	M	Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: MBTA Rochester Maitenence Facility City/County: Rochester, Plymouth Sampling Date: 5/16/19

Applicant/Owner: MBTA State: MA Sampling Point: 16

Investigator(s): K Degutis, J Rebholz Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR or MLRA): LRR R, MLRA 144B Lat: - Long: - Datum: NAD83

Soil Map Unit Name: 256B-Deerfield loamy fine sand, 3-8% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)
Aerial photo, Northeast Regional Climate Center monthly precip data % deviation from normal
(http://www.nrcc.cornell.edu/regional/monthly/monthly.html)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
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- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: 16

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Acer saccharum*	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1. *Celastrus orbiculatus*	25	Yes	UPL
2. *Smilax*	15	Yes	FAC
3.			
4.			
	40	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	40	x 4 =	160
UPL species	25	x 5 =	125
Column Totals:	80 (A)		330 (B)
Prevalence Index = B/A =			4.13

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/6	100					sandy	refusal at 4 inches, railroad ballast

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
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- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
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- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

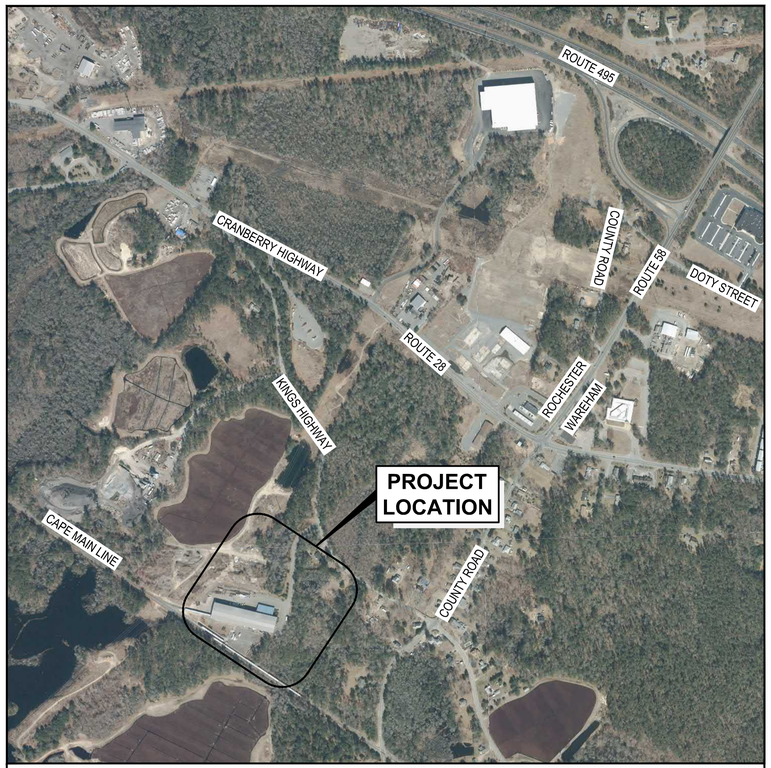
Type: N/A

Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
RR ballast/embankment, non-native material

APPENDIX B – Project Plans



LOCUS MAP
SCALE: 1" = 500'

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

ROCHESTER MAINTENANCE FACILITY

CAPE MAIN COMMUTER RAIL LINE
ROCHESTER, MASSACHUSETTS

NOTICE OF INTENT SUBMITTAL
SEPTEMBER 2021

Jacobs

120 SAINT JAMES AVE.
BOSTON, MA 02116
OFFICE: 617-242-9222
FAX: 617-242-9824

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\709 - GENERAL\30% NOI\ G-001_TITLE.dwg
PLOT DATE: Sep 13, 2021 - 4:04pm

INDEX OF DRAWINGS

PLAN NO.	SHEET NO.	DESCRIPTION
		GENERAL
	G–001	COVER SHEET
	G–002	INDEX OF DRAWINGS, GENERAL NOTES AND LEGEND
		SURVEY
	V–101	EXISTING CONDITIONS PLAN – SHEET 1
	V–102	EXISTING CONDITIONS PLAN – SHEET 2
		CIVIL
	C–201	OVERALL SITE PLAN
	C–211	EROSION CONTROL PLAN – SHEET 1
	C–212	EROSION CONTROL PLAN – SHEET 2
	C–221	SITE PLAN – SHEET 1
	C–222	SITE PLAN – SHEET 2
	C–231	SITE GRADING AND DRAINAGE PLAN – SHEET 1
	C–232	SITE GRADING AND DRAINAGE PLAN – SHEET 2
	C–241	OVERALL SITE UTILITY PLAN
	C–311	WETLAND MITIGATION AREA 1 – PLANS AND DETAILS
	C–312	WETLAND MITIGATION AREA 2 – PLANS AND DETAILS
	C–313	STREAM RELOCATION – PLAN AND DETAILS
	C–501	SITE SECTIONS – SHEET 1
	C–502	SITE SECTIONS – SHEET 2
	C–601	DRAINAGE DETAILS – SHEET 1
	C–602	DRAINAGE DETAILS – SHEET 2
	C–603	SITE DETAILS – SHEET 1
	C–604	SITE DETAILS – SHEET 2
	C–603	EROSION PROTECTION DETAILS
		TRACK
	K–201	TRACK LAYOUT – SHEET 1
	K–202	TRACK LAYOUT – SHEET 2
		STRUCTURAL
	S–301	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 1
	S–302	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 2
	S–303	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 3
	S–304	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 4
	S–305	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 5
	S–306	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 6
	S–307	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 7
	S–308	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 8
	S–309	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 9
	S–310	SOLDIER PILE RETAINING WALL PLAN AND ELEVATION – SHEET 10
	S–501	SECTIONS AND DETAILS

NOTES:

1. THESE NOTES PERTAIN GENERALLY TO ALL "C" (CIVIL) DRAWINGS. ADDITIONAL DISCIPLINE SPECIFIC NOTES ARE INDICATED ON OTHER DISCIPLINE DRAWINGS.
2. EXISTING FEATURES AND GRADES ARE A RESULT OF ON THE GROUND FIELD SURVEY PERFORMED BY FARLAND CORP. IN APRIL 2016, MAY AND JUNE 2019, AND JULY AND AUGUST 2021.
   – HORIZONTAL DATUM IS MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NAD83.
   – VERTICAL DATUM IS NAVD 1988.
3. THE SURFACE EVIDENCE OF THE UTILITIES SHOWN HEREON HAVE BEEN LOCATED BY FIELD SURVEY. THE LINEWORK REPRESENTING UNDERGROUND STRUCTURES AND PIPES HAVE BEEN SHOWN IN THEIR APPROXIMATE LOCATION BASED ON AVAILABLE RECORD PLANS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. (THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE SUBSURFACE UTILITIES).
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE LOCAL UTILITY COMPANIES FOR MAINTENANCE, PROTECTION AND RELOCATION OF THEIR FACILITIES AS REQUIRED FOR THE CONSTRUCTION. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. THE CONTRACTOR SHALL NOTIFY DIG–SAFE AT LEAST 72 BUSINESS HOURS BEFORE ANY CONSTRUCTION BEGINS AT: 1–888–344–7233, OR 811.
5. THE CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND GRADES IN THE FIELD BEFORE COMMENCING ANY WORK AND PROMPTLY NOTIFY THE ENGINEER OF ANY DISCREPANCIES. WHERE THE CLEAR INTENT OF THE NEW WORK IS TO MATCH EXISTING CONDITIONS, THE FIELD DATA SHALL GOVERN.
6. ALL ITEMS DESIGNATED "REMOVE" AND NOT RELOCATED AS PART OF THIS PROJECT, AND DETERMINED TO BE IN SALVAGEABLE CONDITION BY THE ENGINEER, SHALL BE DELIVERED TO MBTA RAILROAD OPERATIONS MATERIAL YARD IN CHARLESTOWN, MA, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL APPROPRIATE STATE AND LOCAL PERMITS FOR THE CONSTRUCTION OF THE STATION.
8. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE NATIONAL POLLUANT DISCHARGE ELIMINATION SYSTEM PROGRAM AND SHALL SUBMIT A NOTICE OF INTENT TO THE ENVIRONMENTAL PROTECTION AGENCY UNDER THE CONSTRUCTION GENERAL PERMIT. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) INSPECTIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS STATED OTHERWISE IN THE SWPPP.
9. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS.

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
76	CONTOUR LINE	76
EOP	EDGE OF PAVEMENT	
VCC	VERTICAL CONCRETE CURB	
CCB	CAPE COD BERM	
E/C E/C	ELECTRIC, TELEPHONE AND CABLE	
OHW OHW	OVERHEAD WIRES	
	CATCH BASIN	CBN
	DRAIN MANHOLE	DMH
	FLARED END SECTION	FES
	OVERFLOW STRUCTURE	
	CLEANOUT	CO
D D	DRAIN LINE	D
	ELECTRIC AND COMMUNICATIONS DUCTBANK	E/C
	WATER LINE	W
	COMPRESSED AIR	CA
X X X X	FENCE	X X X X
	GUARDRAIL	o
	SIGN	
	BOLLARD	
	UTILITY POLE	
	GUY WIRE	
	SEWER MANHOLE	
	FLOOD LIGHT	
	WELL	
	AC UNIT	
RD	ROOF DRAIN	
	ELECTRIC BOX	
	ELECTRIC HANDHOLE	
	PINE TREE	
	DECIDUOUS TREE	
W-FLG	WETLAND FLAGS	
	TEST HOLE	
99.9	SPOT ELEVATION	X 22.5
99.9	SPOT ELEVATION AT CROSS CUT	
	SEAM LINE LOCATION	
TH-99.9	THRESHOLD ELEVATION	
	STREAM	
	NOT IN CONTRACT	N.I.C.
	ADJUST UTILITY COVER	ADJ
	BITUMINOUS CONCRETE	BIT. CONC.
	CEMENT CONCRETE	CEM. CONC.
	TOP OF RAIL	TOR
	ELEVATION	ELEV.
	TOP OF WALL	TW
	R&R	REMOVE AND REPLACE

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED
PROFESSIONAL ENGINEER
Thomas W. Morin
3/15/21

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

INDEX OF DRAWINGS, GENERAL NOTES AND LEGEND

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

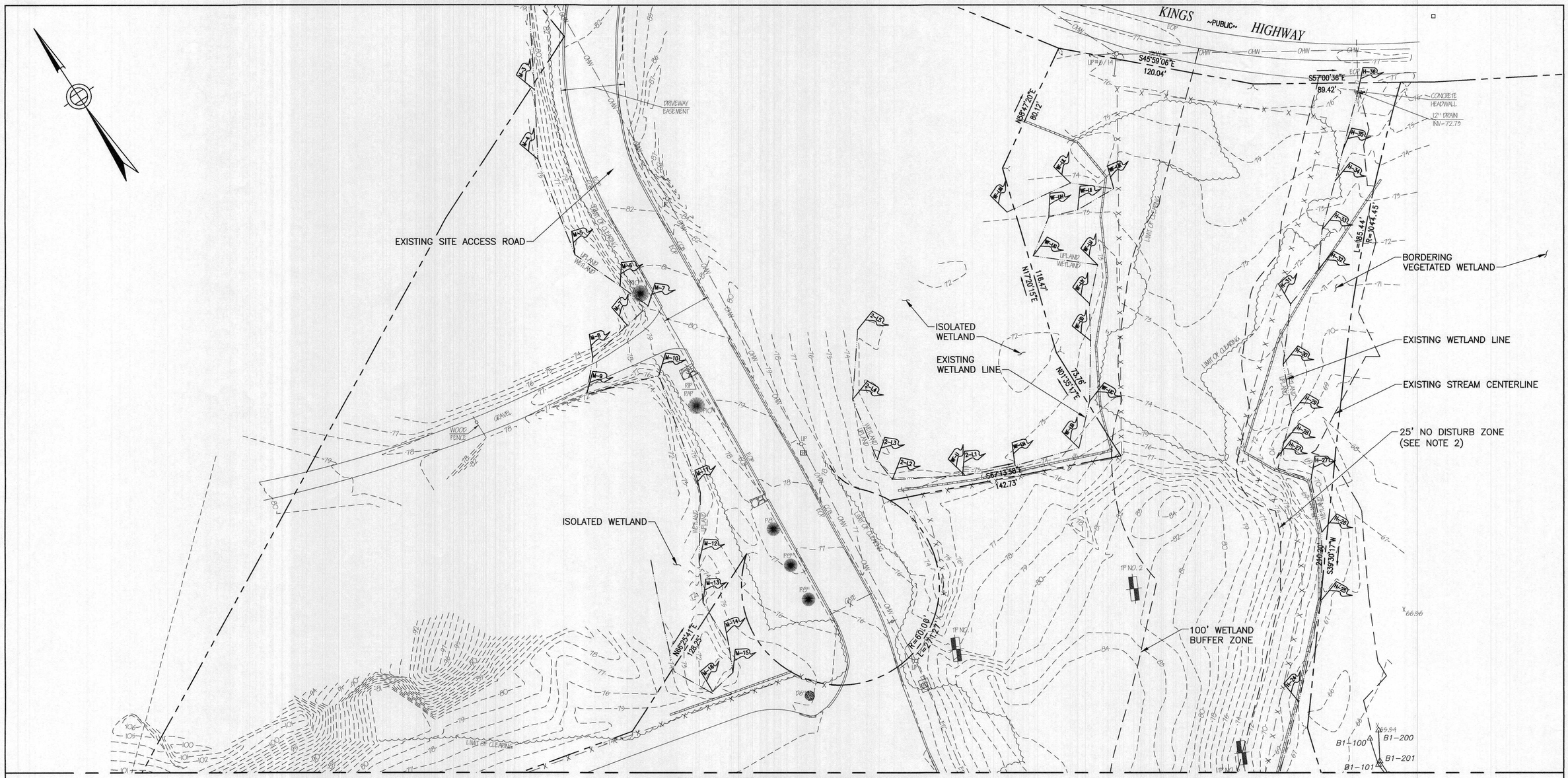
Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: N/A	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	DBW	PJC	SHEET G-002	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\709 – GENERAL\308 NOI\ G–002 Index and General Notes.dwg
PLOT DATE: Sep 13, 2021 – 4:05pm



NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G–002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

SCALE IN FEET
30 0 30 60

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. MURPHY
No. 38387
REGISTERED PROFESSIONAL ENGINEER

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EXISTING CONDITIONS PLAN
SHEET 1

massDOT
Massachusetts Department of Transportation

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CKG/SB	DBW	BJM	SHEET V-101	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ V-101_102_EXIST CONDITIONS.dwg
PLOT DATE: Sep 13, 2021 – 3:46pm

MATCH LINE – SEE SHEET V–101 FOR CONTINUATION

N/F
45 KINGS HIGHWAY REALTY LLC
DEED BOOK: 46719, PAGE: 120
PLAN BOOK: 59, PAGE: 122
ASSESSORS MAP 17, LOT 21
(AREA = 9.01 ACRES)

BENCHMARK
TOP OF BOLT
N: 375218.68
E: 851179.60
ELEV.=76.21 (N.A.V.D. 88)

BENCHMARK
TOP OF BOLT
N: 375209.25
E: 851974.00
ELEV.=76.29 (N.A.V.D. 88)

S76°34'29"E
350.66'

N88°32'52"E
300.90'

S76°44'49"W
198.70'

N72°06'45"W
89.24'

N56°21'45"W
845.01'

S17°30'21"W
206.89'

91.70'

63.72'

26'

20'

100' WETLAND BUFFER ZONE

25' NO DISTURB ZONE (SEE NOTE 2)

EXISTING STREAM BANK

BORDERING VEGETATED WETLAND

EXISTING WETLAND LINE

EXISTING STREAM CENTERLINE

OFFICE AREA (SEE SHEET B FOR DETAIL)

1,500 GALLON SEPTIC TANK

SEPTIC SYSTEM LEACHFIELD

TRANSFORMER

CONC. WALK

CONC. BLOCK

SUPPORT BEAM (TYP.)

ROOF DRAIN (TYP.)

CANOPY

CONC. PAD

RAILROAD TRACKS

EDGE OF PAVEMENT

EDGE OF GRAVEL

EDGE OF BALLAST

LIMIT OF CLEARING

PAVEMENT

GRAVEL

RECYCLED PAVEMENT

CRUSHED STONE

WELL EASEMENT

CONCRETE BLOCK RETAINING WALL

BEAN POLE (SET)

SWITCH

12" PIPE (INV.=72.07)

24" RCP FLARED END SECTION (INV.=72.49)

RCP

RCP FLARED END SECTION

4" VENT

TP NO. 4

TP NO. 5

TP NO. 6

TP NO. 7

TP NO. 8

TP NO. 9

IRON ROD W/ CAP (SET)

IRON ROD W/ LEAD PLUG (SET)

2.8'x4.5' STONE CULVERT INV.=64.5

NOTICE OF INTENT SUBMISSION

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G–002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

SCALE IN FEET
30 0 30 60

PROGRESS SUBMITTAL

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COMMONWEALTH OF MASSACHUSETTS
BRIAN J. MURPHY
No. 38387
REGISTERED PROFESSIONAL ENGINEER

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

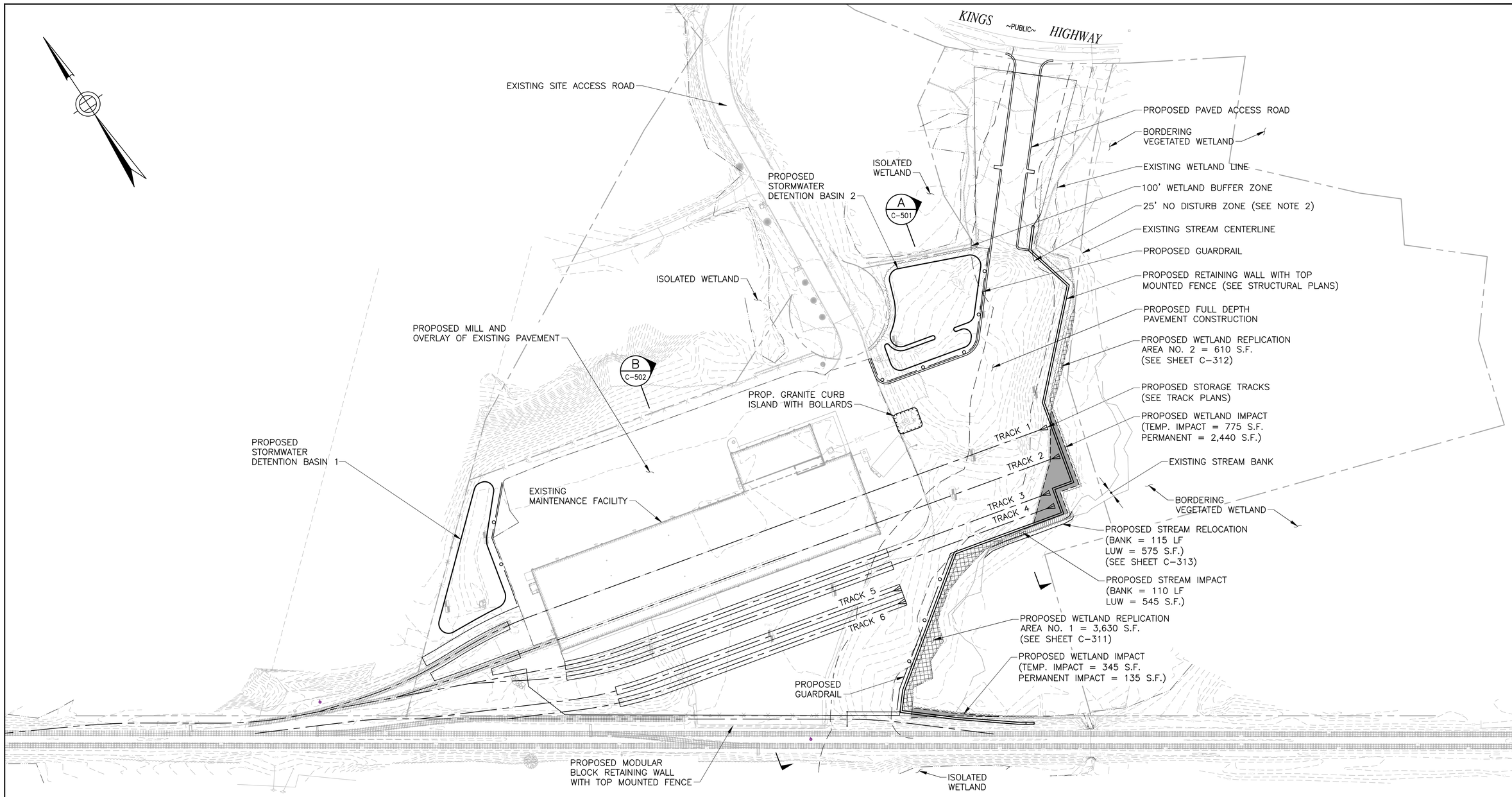
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EXISTING CONDITIONS PLAN SHEET 2

PROJECT MANAGER | DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CKG/SB	DBW	BJM	SHEET V-102	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\V–101_102_EXIST CONDITIONS.dwg
PLOT DATE: Sep 13, 2021 – 3:47pm


KINGS ~PUBLIC~ HIGHWAY
EXISTING SITE ACCESS ROAD
PROPOSED PAVED ACCESS ROAD
BORDERING VEGETATED WETLAND
ISOLATED WETLAND
PROPOSED STORMWATER DETENTION BASIN 2
A C-501
EXISTING WETLAND LINE
100' WETLAND BUFFER ZONE
25' NO DISTURB ZONE (SEE NOTE 2)
EXISTING STREAM CENTERLINE
PROPOSED GUARDRAIL
ISOLATED WETLAND
PROPOSED RETAINING WALL WITH TOP MOUNTED FENCE (SEE STRUCTURAL PLANS)
PROPOSED MILL AND OVERLAY OF EXISTING PAVEMENT
PROPOSED FULL DEPTH PAVEMENT CONSTRUCTION
B C-502
PROPOSED WETLAND REPLICATION AREA NO. 2 = 610 S.F. (SEE SHEET C-312)
PROP. GRANITE CURB ISLAND WITH BOLLARDS
PROPOSED STORAGE TRACKS (SEE TRACK PLANS)
PROPOSED WETLAND IMPACT (TEMP. IMPACT = 775 S.F. PERMANENT = 2,440 S.F.)
TRACK 1
TRACK 2
TRACK 3
TRACK 4
PROPOSED STORMWATER DETENTION BASIN 1
EXISTING MAINTENANCE FACILITY
EXISTING STREAM BANK
BORDERING VEGETATED WETLAND
PROPOSED STREAM RELOCATION (BANK = 115 LF LUW = 575 S.F.) (SEE SHEET C-313)
PROPOSED STREAM IMPACT (BANK = 110 LF LUW = 545 S.F.)
TRACK 5
TRACK 6
PROPOSED WETLAND REPLICATION AREA NO. 1 = 3,630 S.F. (SEE SHEET C-311)
PROPOSED WETLAND IMPACT (TEMP. IMPACT = 345 S.F. PERMANENT IMPACT = 135 S.F.)
PROPOSED GUARDRAIL
PROPOSED MODULAR BLOCK RETAINING WALL WITH TOP MOUNTED FENCE
ISOLATED WETLAND

PLAN
SCALE: 1" = 60'

SCALE IN FEET
60 0 60 120

NOTICE OF INTENT SUBMISSION

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G-002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
Thomas W. Morin
9/15/21

PROGRESS SUBMITTAL

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massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

OVERALL SITE PLAN

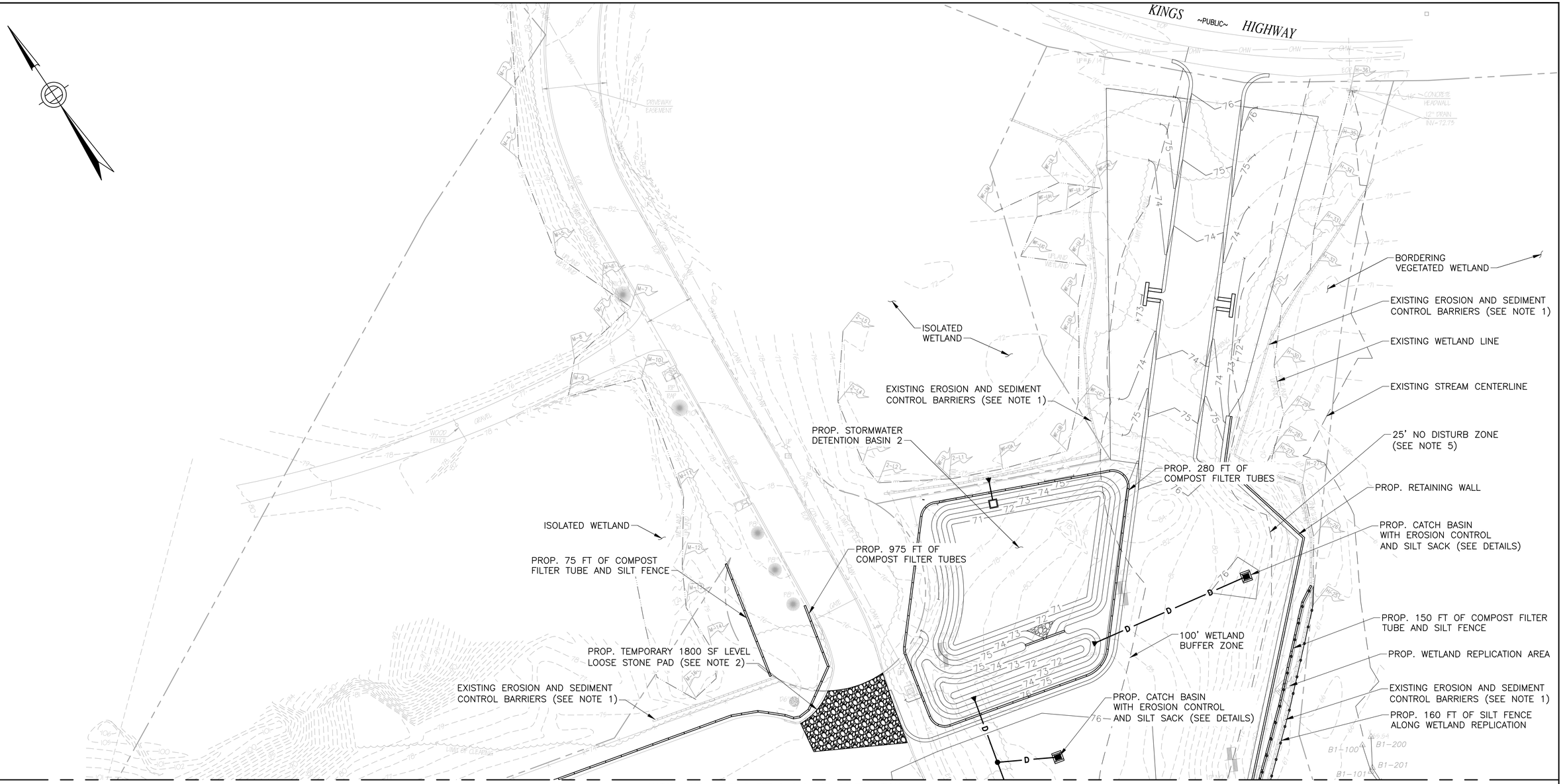
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 60'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	DBW	TWM	SHEET C-201	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-201_OVERALL SITE PLAN.dwg
PLOT DATE: Sep 13, 2021 - 4:06pm


KINGS ~PUBLIC~ HIGHWAY
ISOLATED WETLAND
EXISTING EROSION AND SEDIMENT CONTROL BARRIERS (SEE NOTE 1)
PROP. STORMWATER DETENTION BASIN 2
PROP. 280 FT OF COMPOST FILTER TUBES
ISOLATED WETLAND
PROP. 75 FT OF COMPOST FILTER TUBE AND SILT FENCE
PROP. 975 FT OF COMPOST FILTER TUBES
PROP. TEMPORARY 1800 SF LEVEL LOOSE STONE PAD (SEE NOTE 2)
EXISTING EROSION AND SEDIMENT CONTROL BARRIERS (SEE NOTE 1)
100' WETLAND BUFFER ZONE
PROP. CATCH BASIN WITH EROSION CONTROL AND SILT SACK (SEE DETAILS)
BORDERING VEGETATED WETLAND
EXISTING EROSION AND SEDIMENT CONTROL BARRIERS (SEE NOTE 1)
EXISTING WETLAND LINE
EXISTING STREAM CENTERLINE
25' NO DISTURB ZONE (SEE NOTE 5)
PROP. RETAINING WALL
PROP. CATCH BASIN WITH EROSION CONTROL AND SILT SACK (SEE DETAILS)
PROP. 150 FT OF COMPOST FILTER TUBE AND SILT FENCE
PROP. WETLAND REPLICATION AREA
EXISTING EROSION AND SEDIMENT CONTROL BARRIERS (SEE NOTE 1)
PROP. 160 FT OF SILT FENCE ALONG WETLAND REPLICATION
CONCRETE HEADWALL
12" DRAIN INV=72.75
DRIVEWAY EASEMENT
WOOD FENCE
GRAVEL
LIMIT OF CLEARING
B1-100
B1-101
B1-200
B1-201

MATCH LINE – SEE SHEET C-212 FOR CONTINUATION

NOTES:

1. ALL EXISTING EROSION AND SEDIMENT CONTROL BARRIERS TO BE INSPECTED AND REPLACED AS NECESSARY PRIOR TO ANY EARTHWORK TAKING PLACE.
2. CONTRACTOR TO INSTALL A TEMPORARY LEVEL LOOSE STONE PAD AT SITE ENTRANCE/EXIT TO REMOVE MUD AND SEDIMENT FROM CONSTRUCTION VEHICLE TIRES. PAD TO BE REMOVED AT CONSTRUCTION OF PERMANENT DRIVEWAY. SEE DETAIL SHEET C-603.
3. AT THE END OF EACH WORK DAY, THE CONTRACTOR WILL MAKE REASONABLE EFFORTS TO KEEP THE WORK AREA CLEAN AND FREE OF CONSTRUCTION DEBRIS, RUBBISH, SPOILS, TRASH, AND OTHER FOREIGN MATERIALS. ALL SUCH RUBBISH, DEBRIS AND LIKE MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL ORDINANCES, RULES, AND REGULATIONS OF THE JURISDICTIONAL AUTHORITY, INCLUDING ENVIRONMENTAL REGULATIONS.
4. EXTREME CARE SHALL BE EXERCISED TO PREVENT ANY DEMOLITION AND CONSTRUCTION DEBRIS FROM FALLING INTO WETLAND RESOURCES. IF ANY MATERIAL/EQUIPMENT FALLS IN WETLAND RESOURCES, IT SHALL BE IMMEDIATELY REMOVED.
5. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS.

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
9/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EROSION CONTROL PLAN
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	EW	EW	PJC	SHEET C-211	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-211_212_EROSION CONTROL PLANS.dwg
PLOT DATE: Sep 13, 2021 - 4:06pm

MATCH LINE – SEE SHEET C–211 FOR CONTINUATION

PROP. 975 FT OF COMPOST FILTER TUBES

PROP. STORMWATER DETENTION BASIN 1

PROP. STORM DRAIN

PROP. CATCH BASIN WITH EROSION CONTROL AND SILT SACK (SEE DETAILS)

PROP. CATCH BASIN WITH EROSION CONTROL AND SILT SACK (SEE DETAILS)

REMOVE AND DISPOSE OF 245 FT OF EXISTING EROSION AND SEDIMENT CONTROL BARRIERS

PROP. 150 FT OF COMPOST FILTER TUBE AND SILT FENCE

PROP. RETAINING WALL

PROP. 150 FT OF COMPOST FILTER TUBE AND SILT FENCE FOR STREAM RELOCATION

PROP. 900 FT OF COMPOST FILTER TUBE ALONG BASE OF WALL

100' WETLAND BUFFER ZONE

PROP. WETLAND REPLICATION AREA

EXISTING WETLAND LINE

EXISTING EROSION AND SEDIMENT CONTROL BARRIERS (SEE NOTE 1)

BORDERING VEGETATED WETLAND

PROP. 250 FT OF SILT FENCE ALONG WETLAND REPLICATION

25' NO DISTURB ZONE (SEE NOTE 5)

REMOVE AND DISPOSE OF 150 FT OF EXISTING EROSION AND SEDIMENT CONTROL BARRIERS

PROP. 125 FT OF COMPOST FILTER TUBE AND SILT FENCE

POTENTIAL SOIL STOCKPILE LOCATION (SURROUNDED WITH COMPOST FILTER TUBES)

PROP. CATCH BASIN WITH EROSION CONTROL AND SILT SACK (SEE DETAIL SHEET)

ISOLATED WETLAND

NOTES:

1. ALL EXISTING EROSION AND SEDIMENT CONTROL BARRIERS TO BE INSPECTED AND REPLACED AS NECESSARY PRIOR TO ANY EARTHWORK TAKING PLACE.
2. DEWATERING SHALL BE ADDRESSED THROUGH VARIOUS MEASURES INCLUDING, BUT NOT LIMITED TO, DIRT BAGS SURROUNDED BY STAW WADDLES/HAY BALES PLACE ON LINER/FABRIC AND/OR FRACK TANK WITH DISCHARGE THROUGH DIRT BAG(S).
3. AT THE END OF EACH WORK DAY, THE CONTRACTOR WILL MAKE REASONABLE EFFORTS TO KEEP THE WORK AREA CLEAN AND FREE OF CONSTRUCTION DEBRIS, RUBBISH, SPOILS, TRASH, AND OTHER FOREIGN MATERIALS. ALL SUCH RUBBISH, DEBRIS AND LIKE MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL ORDINANCES, RULES, AND REGULATIONS OF THE JURISDICTIONAL AUTHORITY, INCLUDING ENVIRONMENTAL REGULATIONS.
4. EXTREME CARE SHALL BE EXERCISED TO PREVENT ANY DEMOLITION AND CONSTRUCTION DEBRIS FROM FALLING INTO WETLAND RESOURCES. IF ANY MATERIAL/EQUIPMENT FALLS IN WETLAND RESOURCES, IT SHALL BE IMMEDIATELY REMOVED.
5. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS.

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EROSION CONTROL PLAN
SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

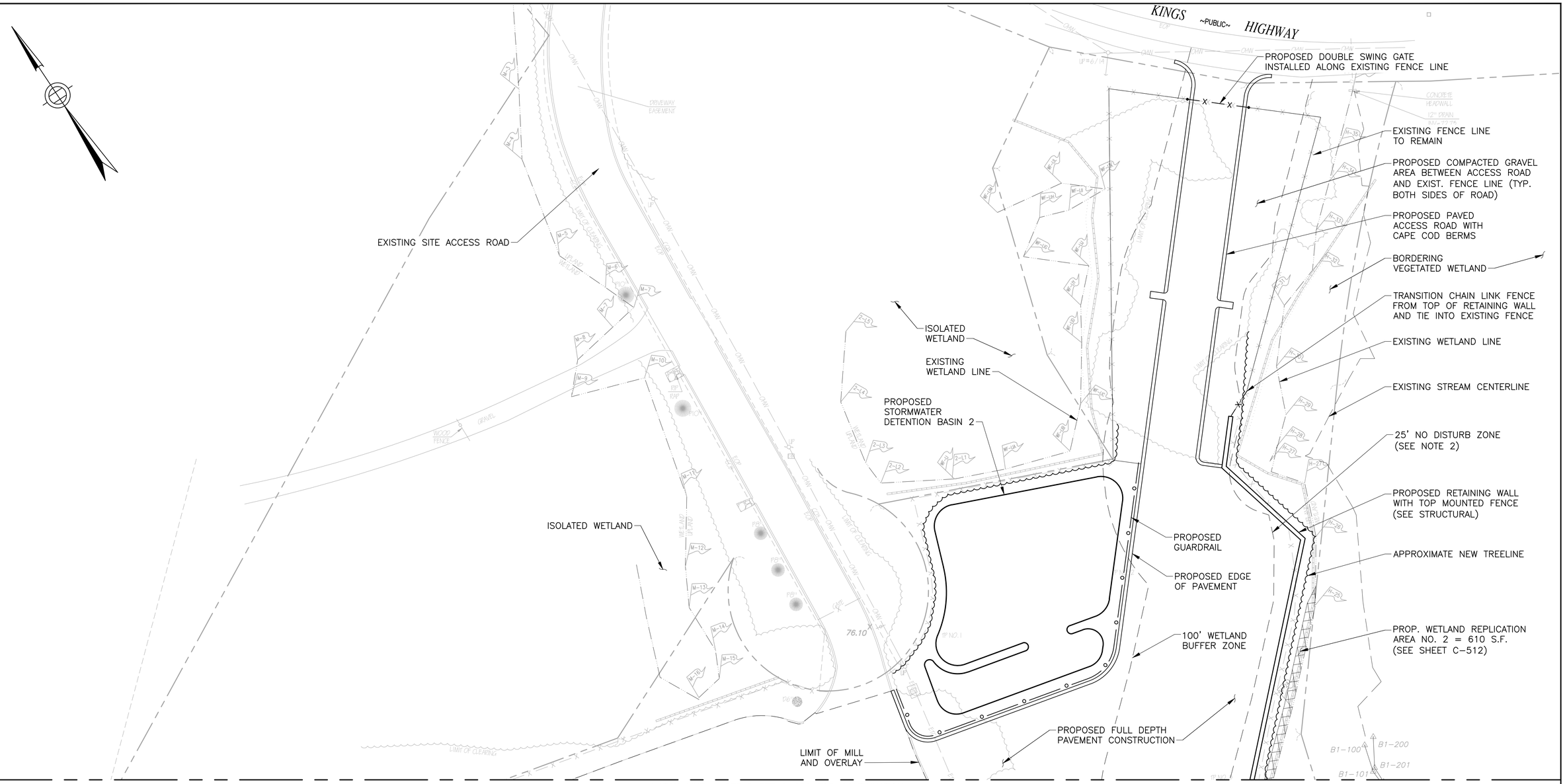
Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	EW	EW	PJC	SHEET C-212	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NOI\ C–211_212_EROSION CONTROL PLANS.dwg
PLOT DATE: Sep 13, 2021 – 4:06pm


KINGS ~PUBLIC~ HIGHWAY
PROPOSED DOUBLE SWING GATE INSTALLED ALONG EXISTING FENCE LINE
EXISTING FENCE LINE TO REMAIN
PROPOSED COMPACTED GRAVEL AREA BETWEEN ACCESS ROAD AND EXIST. FENCE LINE (TYP. BOTH SIDES OF ROAD)
PROPOSED PAVED ACCESS ROAD WITH CAPE COD BERMS
BORDERING VEGETATED WETLAND
TRANSITION CHAIN LINK FENCE FROM TOP OF RETAINING WALL AND TIE INTO EXISTING FENCE
EXISTING WETLAND LINE
EXISTING STREAM CENTERLINE
25' NO DISTURB ZONE (SEE NOTE 2)
PROPOSED RETAINING WALL WITH TOP MOUNTED FENCE (SEE STRUCTURAL)
APPROXIMATE NEW TREELINE
PROP. WETLAND REPLICATION AREA NO. 2 = 610 S.F. (SEE SHEET C-512)
EXISTING SITE ACCESS ROAD
ISOLATED WETLAND
EXISTING WETLAND LINE
PROPOSED STORMWATER DETENTION BASIN 2
ISOLATED WETLAND
PROPOSED GUARDRAIL
PROPOSED EDGE OF PAVEMENT
100' WETLAND BUFFER ZONE
PROPOSED FULL DEPTH PAVEMENT CONSTRUCTION
LIMIT OF MILL AND OVERLAY
LIMIT OF CLEARING
DRIVEWAY EASEMENT
WOOD FENCE
GRAVEL
CONCRETE HEADWALL
12" DRAIN
B1-100
B1-200
B1-101
B1-201

MATCH LINE – SEE SHEET C-222 FOR CONTINUATION

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G-002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE PLAN
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" =30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	DBW	TWM	SHEET C-221	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-221_222_SITE PLANS.dwg
PLOT DATE: Sep 13, 2021 - 4:07pm

MATCH LINE – SEE SHEET C–221 FOR CONTINUATION

PROPOSED STORMWATER DETENTION BASIN 1

PROPOSED FULL DEPTH PAVEMENT CONSTRUCTION

PROPOSED GUARDRAIL

PROPOSED MILL AND OVERLAY OF EXISTING PAVEMENT

EXISTING MAINTENANCE FACILITY

MILL AND OVERLAY

LIMIT OF MILL AND OVERLAY AND FULL DEPTH PAVEMENT (FDP)

LIMIT OF FDP

PROP. EDGE OF PAVEMENT

PROPOSED STORAGE TRACKS

TRACK 1

TRACK 2

TRACK 3

TRACK 4

TRACK 5

TRACK 6

VERTICAL GRANITE CURBING AND BOLLARDS FOR PROTECTION OF EXIST. ELECTRICAL STRUCTURE AND UP

LIMIT OF MILL AND OVERLAY

LIMIT OF FULL DEPTH PAVEMENT CONSTRUCTION

100' WETLAND BUFFER ZONE

PROPOSED BALLAST WITHIN TRACKS 3 THRU 6 (SEE SHEET C–502)

PROPOSED FULL DEPTH PAVEMENT CONSTRUCTION

PROPOSED EDGE OF PAVEMENT

PROPOSED MODULAR BLOCK RETAINING WALL WITH TOP MOUNTED FENCE

REMOVE EXISTING FENCE AND CONCRETE BLOCK WALL

PROPOSED DOUBLE SWING GATE

PROPOSED FENCE LINE

PROPOSED WETLAND IMPACT (TEMP. IMPACT = 775 S.F. PERMANENT = 2,440 S.F.)

EXISTING STREAM BANK

25' NO DISTURB ZONE (SEE NOTE 2)

PROPOSED STREAM RELOCATION (BANK = 115 LF LUW = 575 S.F.)

PROPOSED STREAM IMPACT (BANK = 110 LF LUW = 545 S.F.)

PROPOSED RETAINING WALL WITH TOP MOUNTED FENCE (SEE STRUCTURAL)

APPROXIMATE NEW TREELINE

PROP. WETLAND REPLICATION AREA NO. 1 = 3,630 S.F. (SEE SHEET C–511)

BORDERING VEGETATED WETLAND

EXISTING WETLAND LINE

EXISTING STREAM CENTERLINE

PROPOSED WETLAND IMPACT (TEMP. IMPACT = 345 S.F. PERMANENT IMPACT = 135 S.F.)

ISOLATED WETLAND

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G–002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED
PROFESSIONAL ENGINEER
9/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE PLAN
SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	DBW	TWM	SHEET C-222	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ C–221_222_SITE PLANS.dwg
PLOT DATE: Sep 13, 2021 – 4:07pm

DRAINAGE STRUCTURE TABLE				
ID	RIM	INV. IN (a)	INV. IN (b)	INV. OUT
DMH 1	76.06	73.72		73.65
DMH 2	75.84	73.72	73.42	73.42
DMH 3	75.74	73.62	73.30	73.30
CBN 1	75.70			73.83
CBN 2	75.70			73.83
CBN 3	75.60			73.73
CBN 4	75.80			73.88
FES 1				73.15
FES 2				73.62
OS	73.50			71.50
FES 3				71.45
CBN 5	75.34			73.65
DMH 4	76.25	73.31		73.31
DMH 5	76.20	73.20	73.40	73.20
DMH 6	76.20	72.97		72.97
FES 4				72.94

KINGS ~PUBLIC~ HIGHWAY

PROPOSED CHECK DAM BMP (SEE SHEET C-602)

BORDERING VEGETATED WETLAND

ISOLATED WETLAND

EXISTING WETLAND LINE

PROPOSED STORMWATER DETENTION BASIN 2

EXISTING STREAM CENTERLINE

FES 3

OVERFLOW STRUCTURE (OS) TOP OF GRATE = 73.50

25' NO DISTURB ZONE (SEE NOTE 2)

PROPOSED RETAINING WALL WITH TOP MOUNTED FENCE (SEE STRUCTURAL)

ISOLATED WETLAND

CBN 4

100' WETLAND BUFFER ZONE

PROP. WETLAND REPLICATION AREA NO. 2 (SEE SHEET C-312 FOR GRADING INFO.)

FES 2

OVERFLOW WEIR

STORMWATER BASIN FOREBAY

FES 1

12" RCP CLASS IV

SURFACE FLOW (TYP.)

DMH 3

CBN 3

MATCH LINE – SEE SHEET C-232 FOR CONTINUATION

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G-002.
2. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE GRADING AND DRAINAGE PLAN
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	EP	TWM	SHEET C-231	

FILE NAME: P:\MBTA\2021\E2X8980A – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ C-231_232_GRADING-DRAINAGE PLANS.dwg
PLOT DATE: Sep 13, 2021 – 4:07pm

MATCH LINE – SEE SHEET C–231 FOR CONTINUATION

PROPOSED STORMWATER DETENTION BASIN 1

C
C–502

FES 4

DMH 6

18" RCP CLASS V

18" D.I.

DMH 5

12" D.I.

DMH 4

12" D.I.

REMOVE EXISTING PIPE

CONNECT EXIST. ROOF DRAIN DOWNSPOUTS (TYP.)

CO

SURFACE FLOW (TYP.)

CBN 5

EX. CONC. PAD AT ELEV. 78.4±

ADJ. RIMS

12" D.I.

12" RCP CLASS IV

DMH 2

CBN 2

12" RCP CLASS IV

12" RCP CLASS IV

DMH 1

CBN 1

TRACK 1

TRACK 2

TRACK 3

TRACK 4

TRACK 5

TRACK 6

LEVEL

EXISTING STREAM BANK

25' NO DISTURB ZONE (SEE NOTE 3)

PROPOSED RETAINING WALL WITH TOP MOUNTED FENCE (SEE STRUCTURAL)

PROP. WETLAND REPLICATION AREA NO. 1 (SEE SHEET C–311 FOR GRADING INFO.)

BORDERING VEGETATED WETLAND

EXISTING WETLAND LINE

EXISTING STREAM CENTERLINE

100' WETLAND BUFFER ZONE

ISOLATED WETLAND

74.00

PLAN
SCALE: 1" = 30'

SCALE IN FEET
30 0 30 60

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G–002.
2. FOR DRAINAGE STRUCTURE TABLE SEE SHEET C–231.
3. THE 25 FOOT NO DISTURB ZONE SHOWN FOR INFORMATIONAL PURPOSES ONLY AS THE MBTA IS NOT SUBJECT TO LOCAL BYLAWS

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
9/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE GRADING AND DRAINAGE PLAN SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

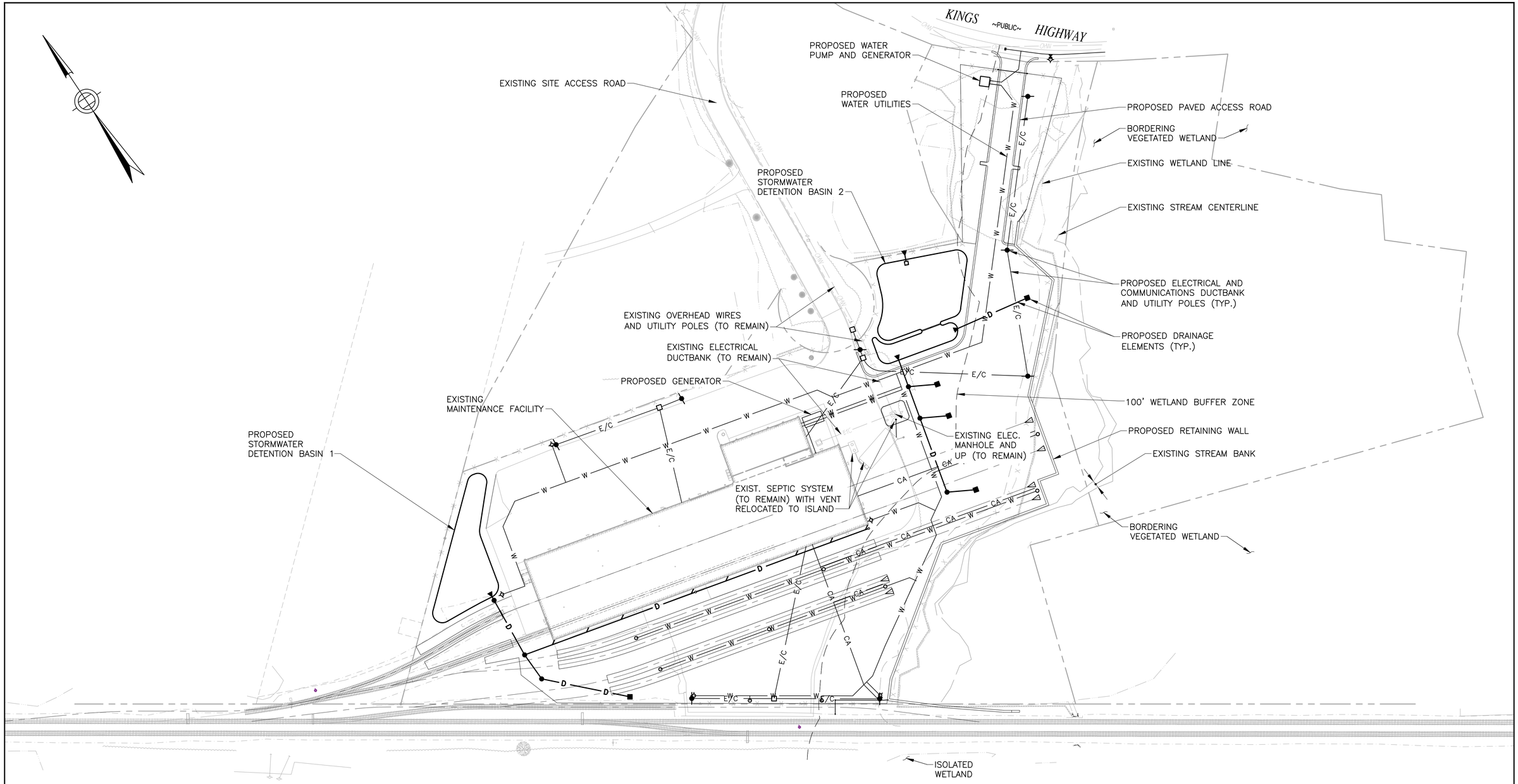
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	EP	TWM	SHEET C-232	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tank Improvements\700 CADD\704 – CIVIL\30% NOI\ C–231_232_GRADING–DRAINAGE PLANS.dwg
PLOT DATE: Sep 13, 2021 – 4:08pm


KINGS ~PUBLIC~ HIGHWAY
PROPOSED WATER PUMP AND GENERATOR
EXISTING SITE ACCESS ROAD
PROPOSED WATER UTILITIES
PROPOSED PAVED ACCESS ROAD
BORDERING VEGETATED WETLAND
PROPOSED STORMWATER DETENTION BASIN 2
EXISTING WETLAND LINE
EXISTING STREAM CENTERLINE
PROPOSED ELECTRICAL AND COMMUNICATIONS DUCTBANK AND UTILITY POLES (TYP.)
EXISTING OVERHEAD WIRES AND UTILITY POLES (TO REMAIN)
EXISTING ELECTRICAL DUCTBANK (TO REMAIN)
PROPOSED DRAINAGE ELEMENTS (TYP.)
PROPOSED GENERATOR
EXISTING MAINTENANCE FACILITY
100' WETLAND BUFFER ZONE
EXISTING ELEC. MANHOLE AND UP (TO REMAIN)
PROPOSED RETAINING WALL
PROPOSED STORMWATER DETENTION BASIN 1
EXISTING STREAM BANK
EXIST. SEPTIC SYSTEM (TO REMAIN) WITH VENT RELOCATED TO ISLAND
BORDERING VEGETATED WETLAND
ISOLATED WETLAND

PLAN
SCALE: 1" = 60'

SCALE IN FEET
60 0 60 120

NOTES:

1. FOR LEGEND AND GENERAL NOTES SEE SHEET G-002.

THOMAS W. MORIN CIVIL No. 40479 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS
3/15/21

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

OVERALL SITE UTILITY PLAN

massDOT Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

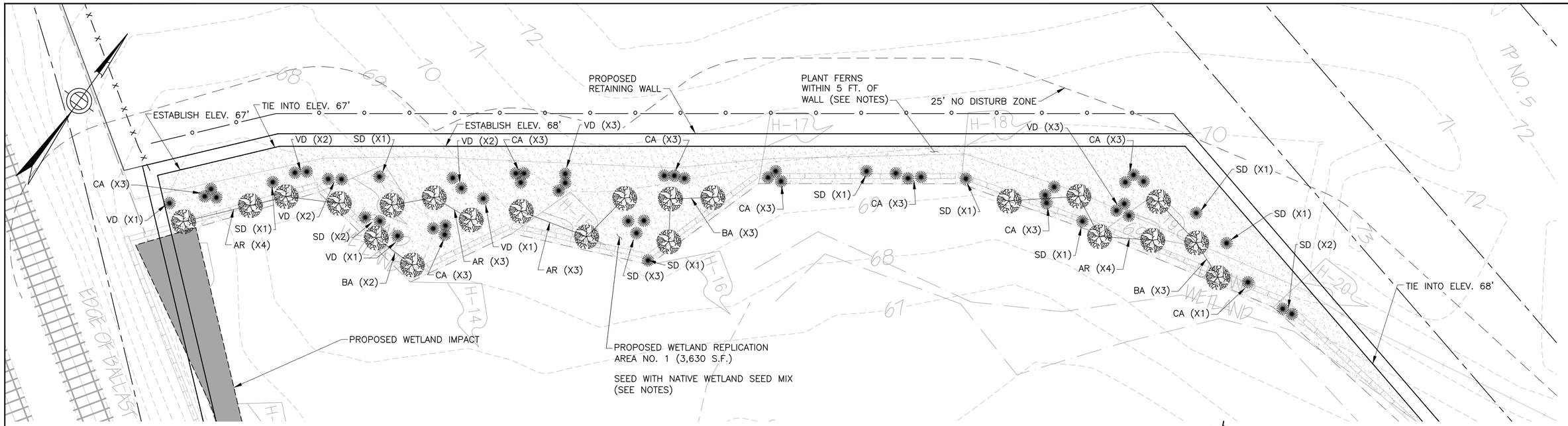
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 60'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	DBW	DBW	TWM	SHEET C-241	

FILE NAME: P:\MBTA\2021\E2X8980A - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-241_OVERALL UTILITY PLAN.dwg
PLOT DATE: Sep 13, 2021 - 4:08pm



PLANTING SCHEDULE

SYMBOL	COMMON NAME	SCIENTIFIC NAME	STRATA	QUANTITY	SIZE
AR	RED MAPLE	ACER RUBRUM	TREE	14	4-6' B&B
BA	YELLOW BIRCH	BETULA ALLEGHANIENSIS	TREE	8	4-6' B&B
CA	SWEET PEPPERBUSH	CLETHRA ALNIFOLIA	SHRUB	25	3-4' CONT.
VD	NORTHERN ARROWWOOD	VIBURNUM DENTATUM	SHRUB	15	3-4' CONT.
SD	SILKY DOGWOOD	CORNUS AMOMUM	SHRUB	15	3-4' CONT.
OC	CINNAMON FERN	OSMUNDA CINNAMOMEA	HERB.	50	1-GAL. CONT.
OS	SENSITIVE FERN	ONOCLEA SENSIBILIS	HERB.	75	1-GAL. CONT.

SEED MIX SPECIFICATIONS:

SEED MIX SHALL BE COMPARABLE TO NEW ENGLAND WETLAND PLANTS WET MIX AND INCLUDE FOX SEDGE (CAREX VULPINOIDEA), LURID SEDGE (CAREX LURIDA), BLUNT BROOM SEDGE (CAREX SCOPARIA), BLUE VERVAIN (VERBENA HASTATA), FOWL BLUEGRASS (POA PALUSTRIS), HOP SEDGE (CAREX LUPULINA), GREEN BULRUSH (SCIRPUS ATROVIRENS), CREEPING SPIKE RUSH (ELEOCHARIS PALUSTRIS), FRINGED SEDGE (CAREX CRINITA), SOFT RUSH (JUNCUS EFFUSUS), SPOTTED JOE PYE WEED (EUPATORIUM MACULATUM), RATTLESNAKE GRASS (GLYCERIA CANADENSIS), SWAMP ASTER (ASTER PUNICEUS), BLUEFLAG (IRIS VERSICOLOR), SWAMP MILKWEED (ASCLEPIAS INCARNATA), AND SQUARE STEMMED MONKEY FLOWER (MIMULUS RINGENS).

APPLICATION RATE = 1 LB./2500 SQ. FT.
18 LBS./ACRE

WETLAND REPLICATION NOTES:

1.) PRIOR TO GRADING THE REPLICATION AREA, EROSION CONTROLS SHALL BE INSTALLED ALONG THE DOWNGRADIENT AND UPGRADIENT EXTENTS.

2.) ALL SPECIES IDENTIFIED ON THIS PLAN SHALL BE USED UNLESS DIRECTED OTHERWISE BY THE ROCHESTER CONSERVATION COMMISSION. CULTIVARS SHALL NOT BE PLANTED.

3.) THE PLACEMENT OF PLANTINGS DEPICTED ON THIS PLAN SHALL BE USED AS A GUIDE AND IS NOT INTENDED TO DISCOURAGED FIELD ADJUSTMENTS BASED ON CONDITIONS.

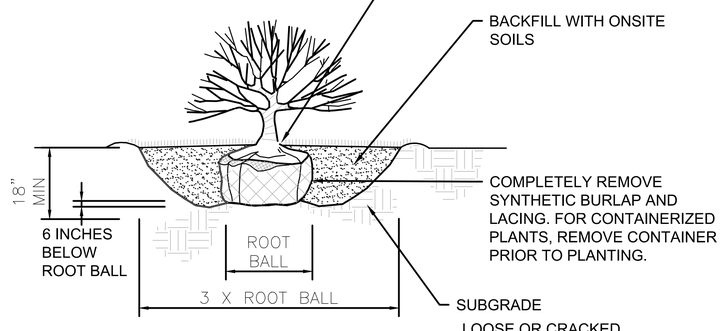
4.) A QUALIFIED PROFESSIONAL SHALL OVERSEE PLANTING WITHIN THE WETLAND REPLICATION AREA AND DIRECT THE CONTRACTORS ON EXACT PLACEMENT AND CLUSTERING OF PLANTINGS.

5.) FERNS PROPOSED WITHIN 5 FEET OF THE FACE OF THE RETAINING WALL SHALL BE PLANTED IN ACCORDANCE WITH THE OVERSEEING PROFESSIONAL'S RECOMMENDATIONS.

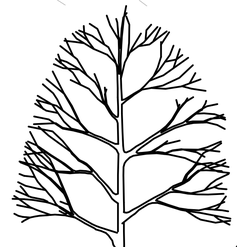
6.) THE WETLAND REPLICATION AREA SHALL BE IMMEDIATELY SEEDED WITH NEW ENGLAND WETLAND PLANTS WET MIX OR A COMPARABLE BLEND OF NATIVE, HYDROPHYTIC SPECIES AS APPROVED BY THE ROCHESTER CONSERVATION COMMISSION. SHOULD FAVORABLE GROWING CONDITIONS NOT BE PRESENT, THE REPLICATION AREA SHALL BE COVERED WITH STRAW MULCH FREE OF SEED-HEADS AND SEEDED UPON COMMENCEMENT OF THE NEXT GROWING SEASON.

7.) SEE THE ACCOMPANYING NOTICE OF INTENT NARRATIVE FOR INFORMATION ON SEQUENCING OF ESTABLISHING THE REPLICATION AREAS.

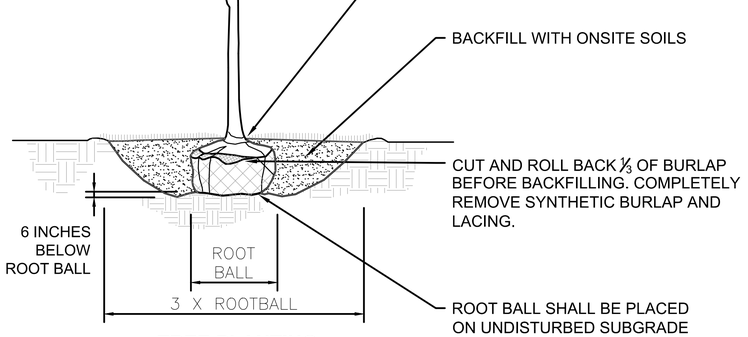
8.) PLANTINGS SHALL BE SUFFICIENTLY IRRIGATED FOLLOWING INSTALLATION.


SHRUB SHALL BE PLANTED SO THAT THE CROWN IS 2 INCHES ABOVE FINISHED GRADE AFTER SETTLEMENT
BACKFILL WITH ONSITE SOILS
COMPLETELY REMOVE SYNTHETIC BURLAP AND LACING. FOR CONTAINERIZED PLANTS, REMOVE CONTAINER PRIOR TO PLANTING.
SUBGRADE
LOOSE OR CRACKED ROOTBALLS WILL NOT BE ACCEPTED FOR PLANTING
18" MIN
6 INCHES BELOW ROOT BALL
ROOT BALL
3 X ROOT BALL

SHRUB PLANTING
NOT TO SCALE



NOTES:
1. DO NOT CUT LEADER.
2. TREE WRAP SHALL NOT BE USED.
3. TREE SHALL BE SET PLUMB.


TREE SHALL BE PLANTED SO THAT THE CROWN IS 2 INCHES ABOVE FINISHED GRADE AFTER SETTLEMENT
BACKFILL WITH ONSITE SOILS
CUT AND ROLL BACK ⅓ OF BURLAP BEFORE BACKFILLING. COMPLETELY REMOVE SYNTHETIC BURLAP AND LACING.
ROOT BALL SHALL BE PLACED ON UNDISTURBED SUBGRADE
6 INCHES BELOW ROOT BALL
ROOT BALL
3 X ROOTBALL

TREE PLANTING
NOT TO SCALE

SCALE IN FEET
10 0 10 20

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
9/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

WETLAND REPLICATION AREA 1
PLAN AND DETAILS

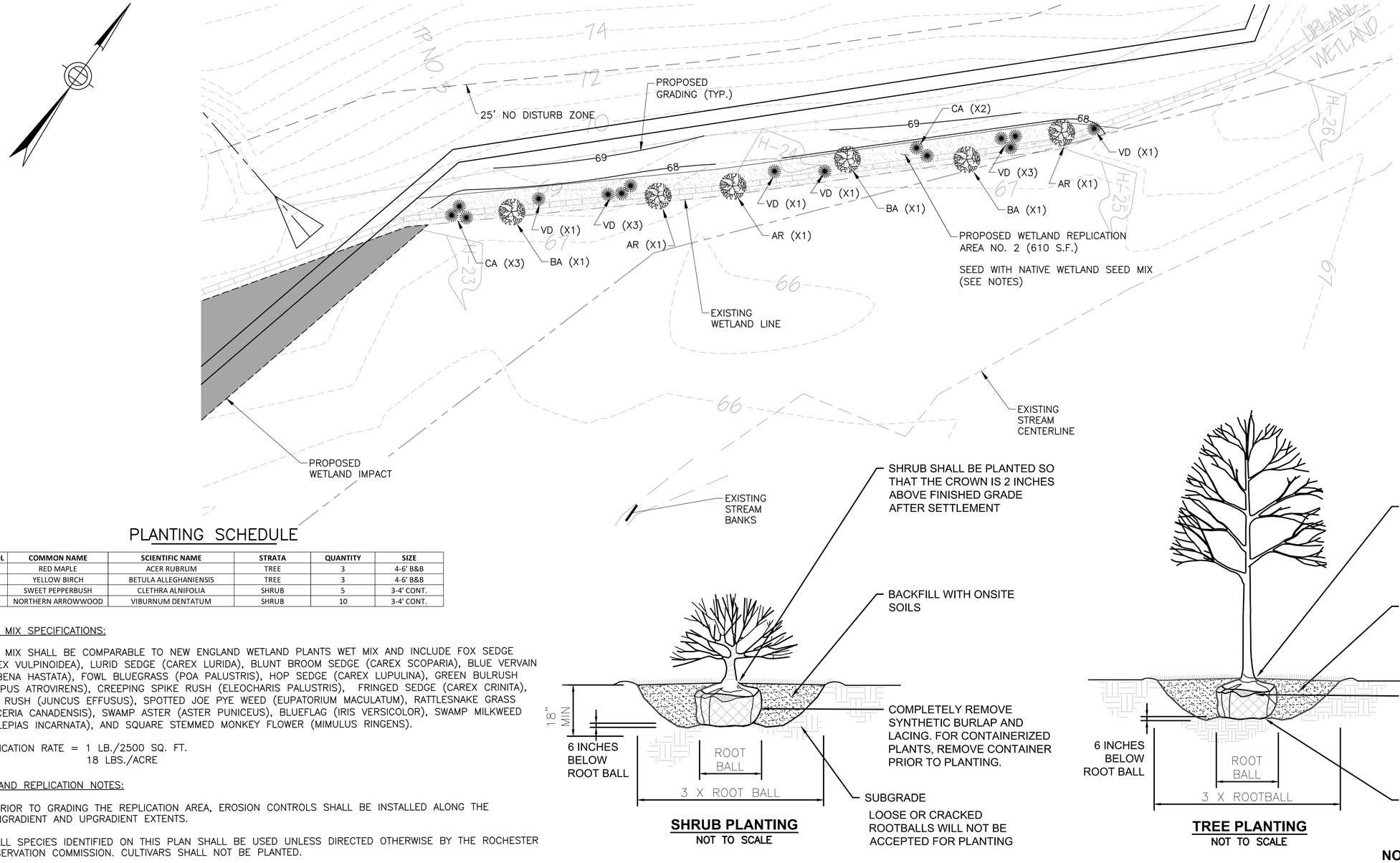
Jacobs
PROJECT MANAGER DATE

SBETA
www.BETA-Inc.com
PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1"=10'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	JN	JN	MN	SHEET C-311	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-311_313_WETLAND PLANS.dwg
PLOT DATE: Sep 13, 2021 - 4:09pm



PLANTING SCHEDULE

SYMBOL	COMMON NAME	SCIENTIFIC NAME	STRATA	QUANTITY	SIZE
AR	RED MAPLE	ACER RUBRUM	TREE	3	4-6' B&B
BA	YELLOW BIRCH	BETULA ALLEGHANIENSIS	TREE	3	4-6' B&B
CA	SWEET PEPPERBUSH	CLETHRA ALNIFOLIA	SHRUB	5	3-4' CONT.
VD	NORTHERN ARROWWOOD	VIBURNUM DENTATUM	SHRUB	10	3-4' CONT.

SEED MIX SPECIFICATIONS:

SEED MIX SHALL BE COMPARABLE TO NEW ENGLAND WETLAND PLANTS WET MIX AND INCLUDE FOX SEDGE (CAREX VULPINOIDEA), LURID SEDGE (CAREX LURIDA), BLUNT BROOM SEDGE (CAREX SCOPARIA), BLUE VERVAIN (VERBENA HASTATA), FOWL BLUEGRASS (POA PALUSTRIS), HOP SEDGE (CAREX LUPULINA), GREEN BULRUSH (SCIRPUS ATROVIRENS), CREEPING SPIKE RUSH (ELEOCHARIS PALUSTRIS), FRINGED SEDGE (CAREX CRINITA), SOFT RUSH (JUNCUS EFFUSUS), SPOTTED JOE PYE WEED (EUPATORIUM MACULATUM), RATTLESNAKE GRASS (GLYCERIA CANADENSIS), SWAMP ASTER (ASTER PUNICEUS), BLUEFLAG (IRIS VERSICOLOR), SWAMP MILKWEED (ASCLEPIAS INCARNATA), AND SQUARE STEMMED MONKEY FLOWER (MIMULUS RINGENS).

APPLICATION RATE = 1 LB./2500 SQ. FT.
18 LBS./ACRE

WETLAND REPLICATION NOTES:

1.) PRIOR TO GRADING THE REPLICATION AREA, EROSION CONTROLS SHALL BE INSTALLED ALONG THE DOWNGRADIENT AND UPGRADIENT EXTENTS.

2.) ALL SPECIES IDENTIFIED ON THIS PLAN SHALL BE USED UNLESS DIRECTED OTHERWISE BY THE ROCHESTER CONSERVATION COMMISSION. CULTIVARS SHALL NOT BE PLANTED.

3.) THE PLACEMENT OF PLANTINGS DEPICTED ON THIS PLAN SHALL BE USED AS A GUIDE AND IS NOT INTENDED FOR DISCOURAGED FIELD ADJUSTMENTS BASED ON CONDITIONS.

4.) A QUALIFIED PROFESSIONAL SHALL OVERSEE PLANTING WITHIN THE WETLAND REPLICATION AREA AND DIRECT THE CONTRACTORS ON EXACT PLACEMENT AND CLUSTERING OF PLANTINGS.

5.) FERNS PROPOSED WITHIN 5 FEET OF THE FACE OF THE RETAINING WALL SHALL BE PLANTED IN ACCORDANCE WITH THE OVERSEEING PROFESSIONAL'S RECOMMENDATIONS.

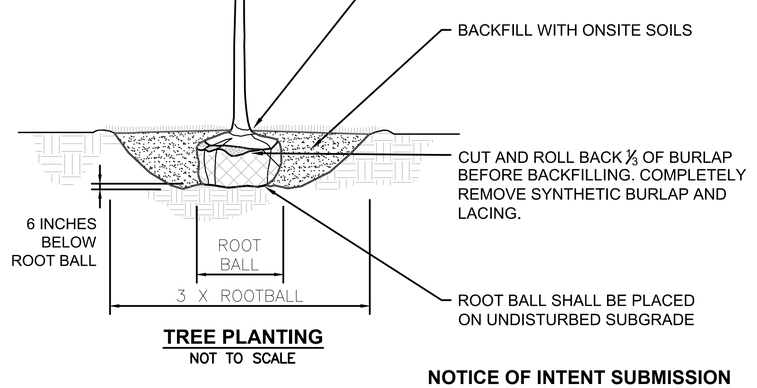
6.) THE WETLAND REPLICATION AREA SHALL BE IMMEDIATELY SEEDED WITH NEW ENGLAND WETLAND PLANTS WET MIX OR A COMPARABLE BLEND OF NATIVE, HYDROPHYTIC SPECIES AS APPROVED BY THE ROCHESTER CONSERVATION COMMISSION. SHOULD FAVORABLE GROWING CONDITIONS NOT BE PRESENT, THE REPLICATION AREA SHALL BE COVERED WITH STRAW MULCH FREE OF SEED-HEADS AND SEEDED UPON COMMENCEMENT OF THE NEXT GROWING SEASON.

7.) SEE THE ACCOMPANYING NOTICE OF INTENT NARRATIVE FOR INFORMATION ON SEQUENCING OF ESTABLISHING THE REPLICATION AREAS.

8.) PLANTINGS SHALL BE SUFFICIENTLY IRRIGATED FOLLOWING INSTALLATION.

SHRUB SHALL BE PLANTED SO THAT THE CROWN IS 2 INCHES ABOVE FINISHED GRADE AFTER SETTLEMENT
BACKFILL WITH ONSITE SOILS
COMPLETELY REMOVE SYNTHETIC BURLAP AND LACING. FOR CONTAINERIZED PLANTS, REMOVE CONTAINER PRIOR TO PLANTING.
SUBGRADE
LOOSE OR CRACKED ROOTBALLS WILL NOT BE ACCEPTED FOR PLANTING
18" MIN
6 INCHES BELOW ROOT BALL
ROOT BALL
3 X ROOT BALL

SHRUB PLANTING
NOT TO SCALE


NOTES:
1. DO NOT CUT LEADER.
2. TREE WRAP SHALL NOT BE USED.
3. TREE SHALL BE SET PLUMB.
TREE SHALL BE PLANTED SO THAT THE CROWN IS 2 INCHES ABOVE FINISHED GRADE AFTER SETTLEMENT
BACKFILL WITH ONSITE SOILS
CUT AND ROLL BACK 1/3 OF BURLAP BEFORE BACKFILLING. COMPLETELY REMOVE SYNTHETIC BURLAP AND LACING.
ROOT BALL SHALL BE PLACED ON UNDISTURBED SUBGRADE
6 INCHES BELOW ROOT BALL
ROOT BALL
3 X ROOTBALL

TREE PLANTING
NOT TO SCALE

SCALE IN FEET
10 0 10 20

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/21

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massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

WETLAND REPLICATION AREA 2
PLAN AND DETAILS

Jacobs — PROJECT MANAGER — DATE
SEBETA (www.BETA-Inc.com) — PROJECT MANAGER — DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1"=10'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
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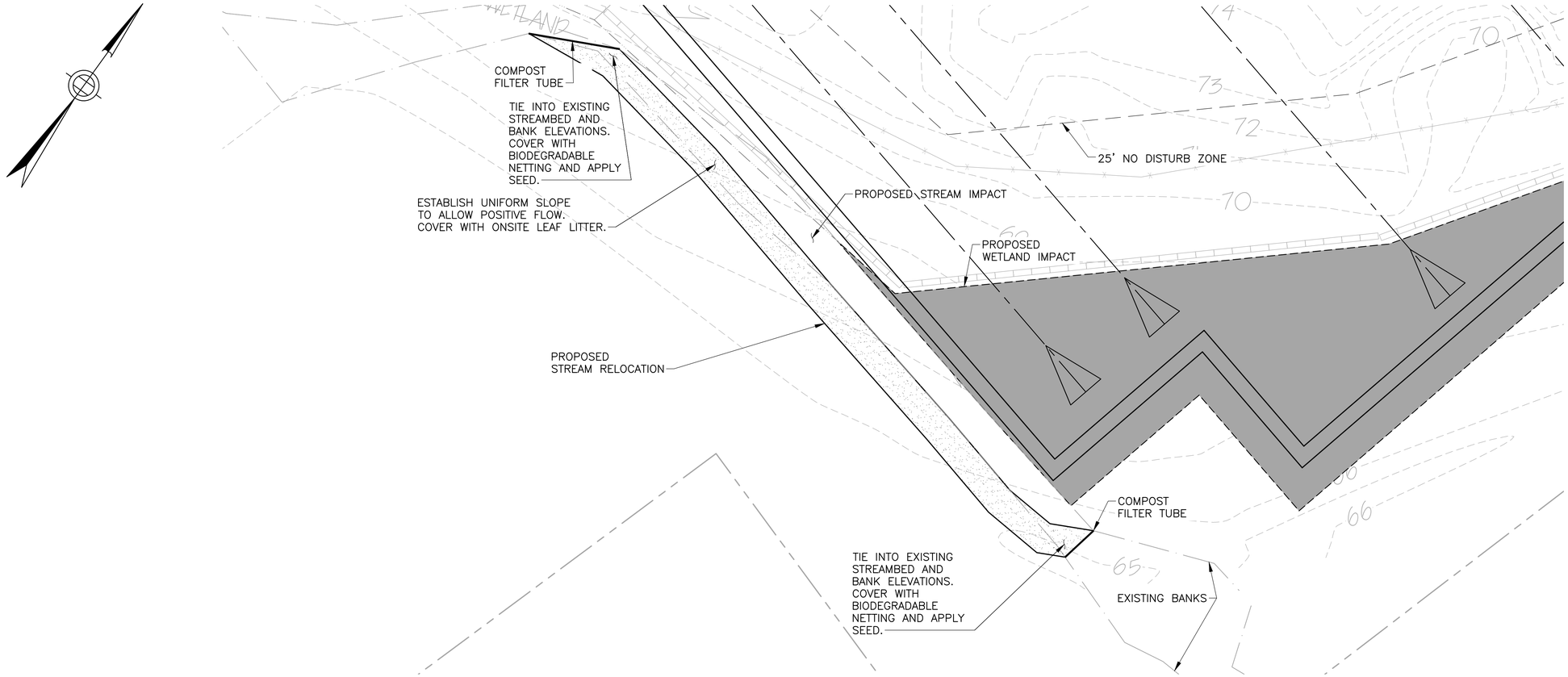
WETLAND
COMPOST FILTER TUBE
TIE INTO EXISTING STREAMBED AND BANK ELEVATIONS. COVER WITH BIODEGRADABLE NETTING AND APPLY SEED.
ESTABLISH UNIFORM SLOPE TO ALLOW POSITIVE FLOW. COVER WITH ONSITE LEAF LITTER.
PROPOSED STREAM RELOCATION
PROPOSED STREAM IMPACT
PROPOSED WETLAND IMPACT
25' NO DISTURB ZONE
COMPOST FILTER TUBE
TIE INTO EXISTING STREAMBED AND BANK ELEVATIONS. COVER WITH BIODEGRADABLE NETTING AND APPLY SEED.
EXISTING BANKS
74
73
72
70
66
65

STREAM REPLICATION NOTES:

1.) PRIOR TO EXCAVATING THE NEW STREAM CHANNEL, EROSION CONTROLS SHALL BE INSTALLED AT THE INTERFACE OF THE NEW SOUTHEASTERN BANK AND THE ADJACENT WETLAND.

2.) A QUALIFIED PROFESSIONAL SHALL OVERSEE STREAM REPLICATION AND ASSIST CONTRACTORS WITH MEETING THE INTENT OF THIS PLAN.

3.) ELEVATIONS OF THE STREAM BED AND BANKS SHALL FIRST BE ESTABLISHED AT EACH END OF THE REPLICATION AREA. A CONSISTENT SLOPE FACILITATING POSITIVE FLOW WILL BE ESTABLISHED BETWEEN THESE TWO POINTS.

4.) BANK SLOPES SHALL TIE INTO EXISTING BANKS AT BOTH ENDS OF THE REPLICATION AREA. ONCE BANKS ARE CONSTRUCTED, INSTALL COMPOST FILTER TUBES AT BOTH ENDS OF THE NEW STREAM SEGMENT.

5.) THE NEWLY CONSTRUCTED BANKS SHALL BE IMMEDIATELY COVERED WITH A BIODEGRADABLE NETTING SECURELY STAKED INTO THE GROUND.

6.) THE NEWLY CONSTRUCTED BANKS SHALL BE IMMEDIATELY SEEDED WITH NEW ENGLAND WETLAND PLANTS WET MIX OR A COMPARABLE BLEND OF NATIVE, HYDROPHYTIC SPECIES AS APPROVED BY THE ROCHESTER CONSERVATION COMMISSION. SHOULD FAVORABLE GROWING CONDITIONS NOT BE PRESENT, THE BANKS SHALL BE COVERED WITH STRAW MULCH FREE OF SEED-HEADS AND SEEDED UPON THE COMMENCEMENT OF THE NEXT GROWING SEASON.

7.) THE STREAMBED SHALL BE COVERED WITH ONSITE LEAF LITTER TO SIMULATE CONDITIONS WITHIN THE IMPACTED STREAM CHANNEL.

8.) SEE THE ACCOMPANYING NOTICE OF INTENT NARRATIVE FOR INFORMATION ON SEQUENCING OF ESTABLISHING THE REPLICATION AREAS.

SEED MIX SPECIFICATIONS:

SEED MIX SHALL BE COMPARABLE TO NEW ENGLAND WETLAND PLANTS WET MIX AND INCLUDE FOX SEDGE (CAREX VULPINOIDEA), LURID SEDGE (CAREX LURIDA), BLUNT BROOM SEDGE (CAREX SCOPARIA), BLUE VERVAIN (VERBENA HASTATA), FOWL BLUEGRASS (POA PALUSTRIS), HOP SEDGE (CAREX LUPULINA), GREEN BULRUSH (SCIRPUS ATROVIRENS), CREEPING SPIKE RUSH (ELEOCHARIS PALUSTRIS), FRINGED SEDGE (CAREX CRINITA), SOFT RUSH (JUNCUS EFFUSUS), SPOTTED JOE PYE WEED (EUPATORIUM MACULATUM), RATTLESNAKE GRASS (GLYCERIA CANADENSIS), SWAMP ASTER (ASTER PUNICEUS), BLUEFLAG (IRIS VERSICOLOR), SWAMP MILKWEED (ASCLEPIAS INCARNATA), AND SQUARE STEMMED MONKEY FLOWER (MIMULUS RINGENS).

APPLICATION RATE = 1 LB./2500 SQ. FT.
18 LBS./ACRE

SCALE IN FEET
10 0 10 20

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/22

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Jacobs
PROJECT MANAGER DATE

BETA
www.BETA-Inc.com
PROJECT MANAGER DATE

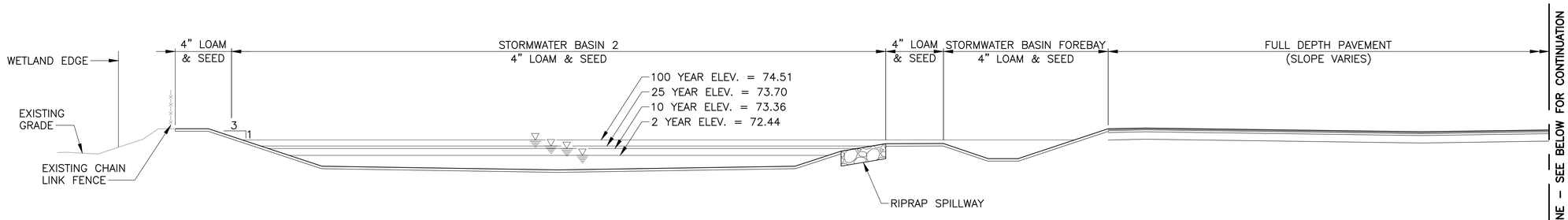
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

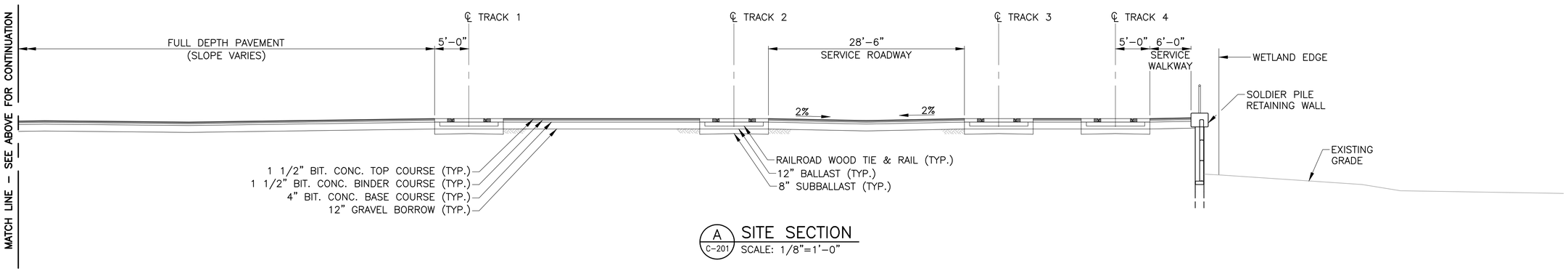
STREAM RELOCATION PLAN AND DETAILS

SCALE: 1"=10'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	JN	JN	MN	SHEET C-313	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\ C-311_313_WETLAND PLANS.dwg
PLOT DATE: Sep 13, 2021 - 4:10pm



A C-201 SITE SECTION
SCALE: 1/8"=1'-0"



A C-201 SITE SECTION
SCALE: 1/8"=1'-0"

SCALE IN FEET
4 0 4 8 12 16

COMMONWEALTH OF MASSACHUSETTS
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CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE SECTIONS
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

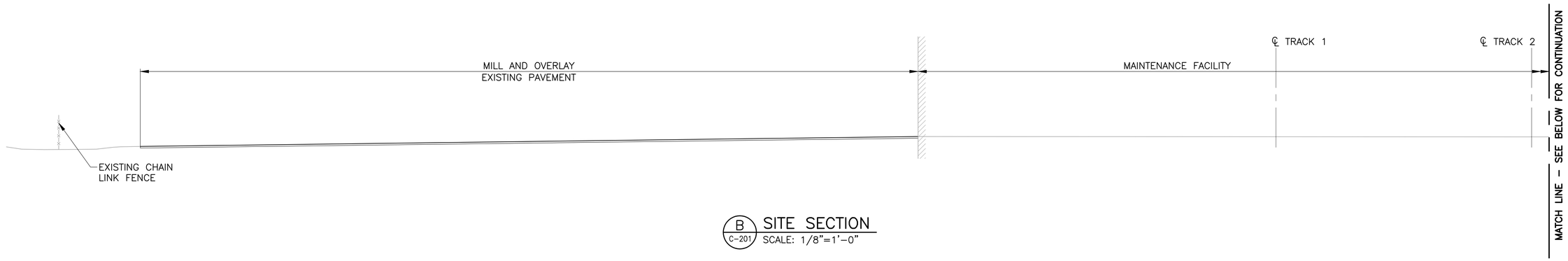
Jacobs

PROJECT MANAGER DATE

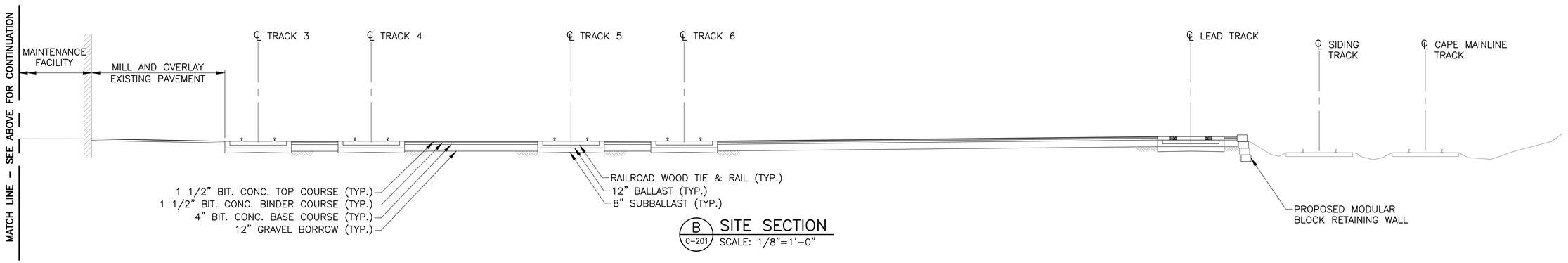
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1/8" = 1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	DBW	PJC	SHEET C-501	

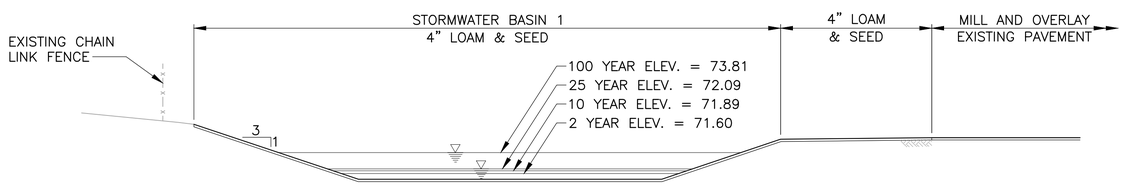
FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NOI\ C-501_502_SITE SECTIONS.dwg
PLOT DATE: Sep 13, 2021 – 4:10pm



B C-201 SITE SECTION
SCALE: 1/8"=1'-0"



B C-201 SITE SECTION
SCALE: 1/8"=1'-0"



C C-232 SITE SECTION
SCALE: 1/8"=1'-0"

SCALE IN FEET
4 0 4 8 12 16

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED
PROFESSIONAL ENGINEER
3/15/21

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE SECTIONS
SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

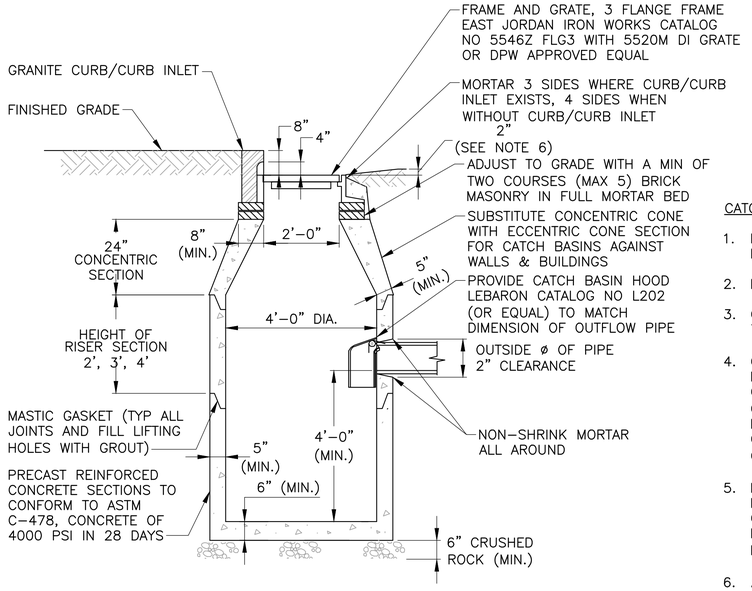
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1/8" = 1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	DBW	PJC	SHEET **C-502**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NOI\ C-501_502_SITE SECTIONS.dwg
PLOT DATE: Sep 13, 2021 – 4:10pm

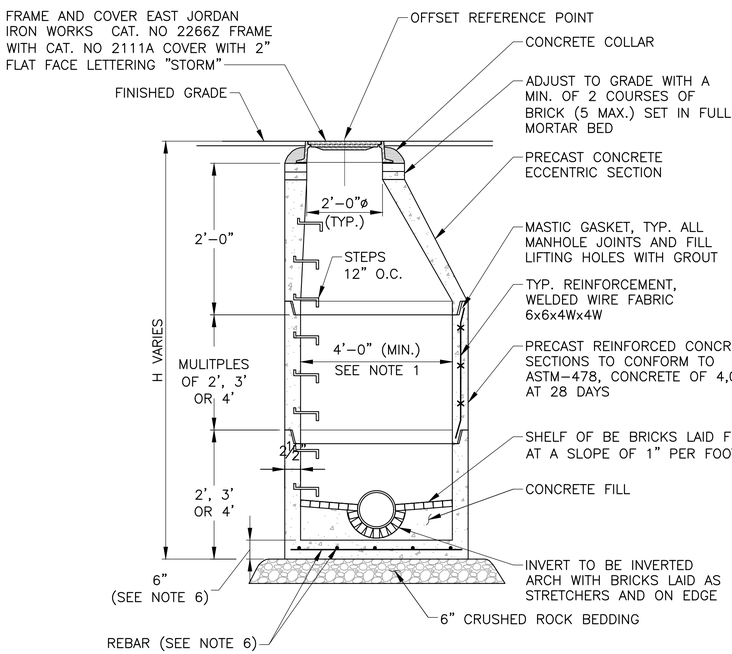

GRANITE CURB/CURB INLET
FINISHED GRADE
FRAME AND GRATE, 3 FLANGE FRAME EAST JORDAN IRON WORKS CATALOG NO 5546Z FLG3 WITH 5520M DI GRATE OR DPW APPROVED EQUAL
MORTAR 3 SIDES WHERE CURB/CURB INLET EXISTS, 4 SIDES WHEN WITHOUT CURB/CURB INLET
8"
4"
2"
(SEE NOTE 6)
ADJUST TO GRADE WITH A MIN OF TWO COURSES (MAX 5) BRICK MASONRY IN FULL MORTAR BED
SUBSTITUTE CONCENTRIC CONE WITH ECCENTRIC CONE SECTION FOR CATCH BASINS AGAINST WALLS & BUILDINGS
8" (MIN.)
2'-0"
24" CONCENTRIC SECTION
5" (MIN.)
PROVIDE CATCH BASIN HOOD LEBARON CATALOG NO L202 (OR EQUAL) TO MATCH DIMENSION OF OUTFLOW PIPE
4'-0" DIA.
HEIGHT OF RISER SECTION 2', 3', 4'
OUTSIDE ø OF PIPE
2" CLEARANCE
MASTIC GASKET (TYP ALL JOINTS AND FILL LIFTING HOLES WITH GROUT)
NON-SHRINK MORTAR ALL AROUND
4'-0" (MIN.)
5" (MIN.)
PRECAST REINFORCED CONCRETE SECTIONS TO CONFORM TO ASTM C-478, CONCRETE OF 4000 PSI IN 28 DAYS
6" (MIN.)
6" CRUSHED ROCK (MIN.)

PRECAST CONCRETE CATCH BASIN

NOT TO SCALE

CATCH BASIN NOTES:

1. PROVIDE RESILIENT CONNECTOR WHERE PIPE ENTERS CATCH BASIN.
2. DESIGN LIVE LOAD HS20-44.
3. CURB INLET TO BE DELETED WHERE THERE IS NO CURB.
4. OFFSET/REFERENCE POINT TO BE LOCATED AT THE CENTERLINE OF THE GRATE ALONG THE FACE OF THE CURB/BERM. OFFSET/REFERENCE POINT TO BE LOCATED AT THE CENTER OF THE GRATE WHERE THERE IS NO CURB/BERM.
5. FRAME AND GRATE TO BE SET 2" LOWER THAN PROPOSED FINISHED GRADE WHERE CURB INLET IS PROPOSED. FOR CURB WITHOUT INLET PROVIDE 6" CURB REVEAL.
6. A 2" DEPRESSION ALONG THE EDGE OF GRATE SHALL BE PAVED AS SHOWN TO INCREASE RUNOFF INTAKE.

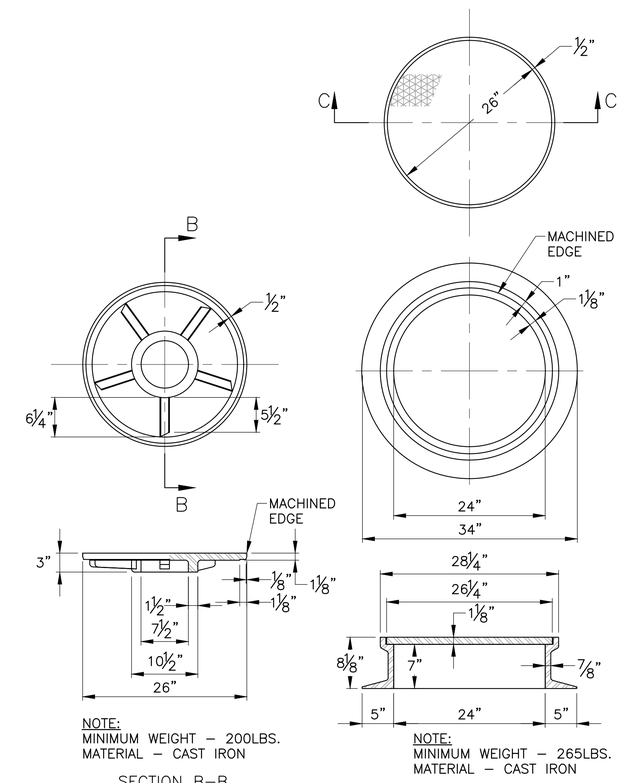

FRAME AND COVER EAST JORDAN IRON WORKS CAT. NO 2266Z FRAME WITH CAT. NO 2111A COVER WITH 2" FLAT FACE LETTERING "STORM"
OFFSET REFERENCE POINT
CONCRETE COLLAR
FINISHED GRADE
ADJUST TO GRADE WITH A MIN. OF 2 COURSES OF BRICK (5 MAX.) SET IN FULL MORTAR BED
PRECAST CONCRETE ECCENTRIC SECTION
2'-0"ø (TYP.)
MASTIC GASKET, TYP. ALL MANHOLE JOINTS AND FILL LIFTING HOLES WITH GROUT
2'-0"
STEPS 12" O.C.
TYP. REINFORCEMENT, WELDED WIRE FABRIC 6x6x4Wx4W
H VARIES
MULITPLES OF 2', 3' OR 4'
4'-0" (MIN.) SEE NOTE 1
PRECAST REINFORCED CONCRETE SECTIONS TO CONFORM TO ASTM-478, CONCRETE OF 4,000 PSI AT 28 DAYS
2½"
SHELF OF BE BRICKS LAID FLAT AT A SLOPE OF 1" PER FOOT
2', 3' OR 4'
CONCRETE FILL
INVERT TO BE INVERTED ARCH WITH BRICKS LAID AS STRETCHERS AND ON EDGE
6" (SEE NOTE 6)
6" CRUSHED ROCK BEDDING
REBAR (SEE NOTE 6)

STORM MANHOLE DETAIL

NOT TO SCALE

STORM MANHOLE NOTES:

1. 5'-0" DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 20 FEET.
2. 6" MIN WALL THICKNESS AND 7 INCH MIN. BASE THICKNESS WITH 5'-0" DIAMETER MANHOLES.
3. PROVIDE RESILIENT CONNECTOR WHERE PIPE ENTERS MANHOLE.
4. DESIGN LIVE LOAD E80 FOR ALL NEW MANHOLES WITHIN 30 FEET OF TRACK.
5. DESIGN LIVE LOAD HS20-44 FOR ALL MANHOLES OUTSIDE 30 FEET OF TRACK.
6. REBAR SIZES:
   H=10' OR LESS - #4 @ 18" EW MID-DEPTH
   H=10' TO 20' - #4 @ 12" EW MID-DEPTH
   H=20' TO 30' - #5 @ 12" EW MID-DEPTH
   IN ADDITION TO WELDED WIRE FABRIC



NOTE:
MINIMUM WEIGHT - 200LBS.
MATERIAL - CAST IRON

SECTION B-B

NOTE:
MINIMUM WEIGHT - 265LBS.
MATERIAL - CAST IRON

SECTION C-C

MANHOLE FRAME & COVER NOTES:
MANHOLE COVERS WITHIN MBTA R.O.W. TO BE MARKED "MBTA-DRAIN'. -SEWER OR -ELEC. AS APPROPRIATE.

ALL OTHER COVERS IN THE PUBLIC WAY AS MUNICIPALITY-OWNED INFRASTRUCTURE SHALL BE EAST JORDAN IRON WORKS CAT. NO 2266Z FRAME WITH CAT. NO 2111A COVER WITH 2 INCH FLAT FACE LETTERING "SEWER" OR "DRAIN" AS APPROPRIATE.

MANHOLE FRAME & COVER DETAIL

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED
PROFESSIONAL ENGINEER
3/15/21

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CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

DRAINAGE DETAILS
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

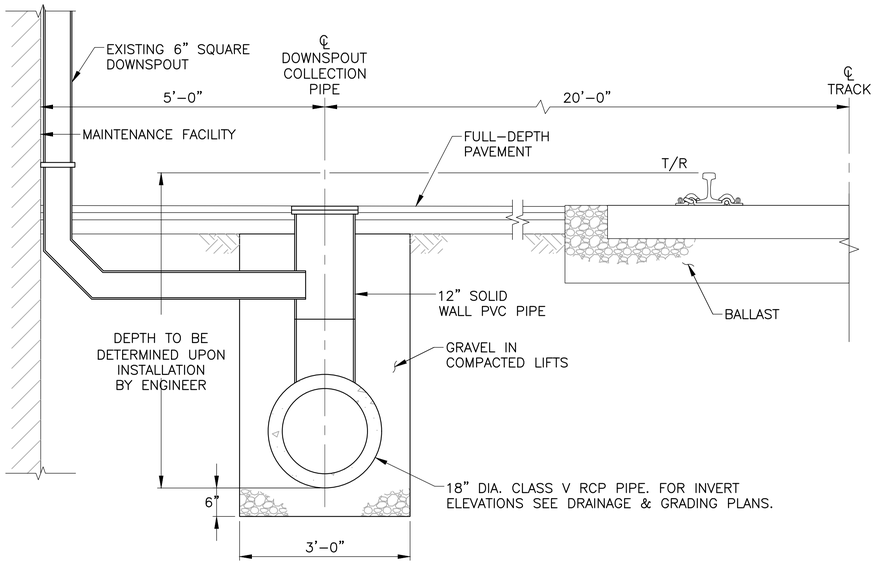
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

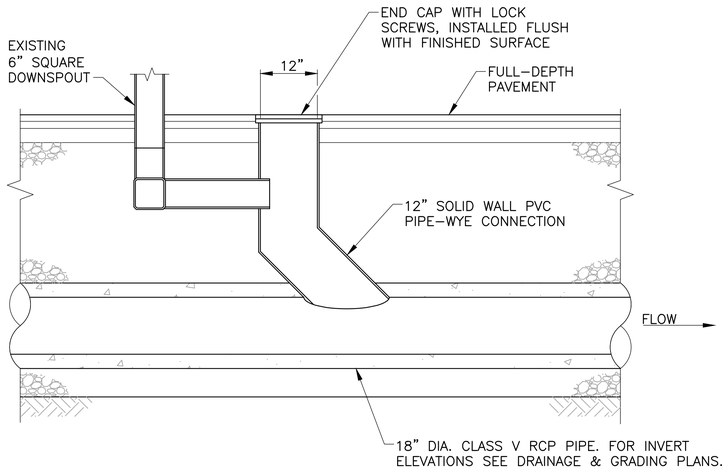
SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	EP	PJC	SHEET C-601	0

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NO\ C-601_602 Drainage Details.dwg
PLOT DATE: Sep 13, 2021 - 4:11pm



DOWNSPOUT COLLECTION SYSTEM DETAIL

NOT TO SCALE

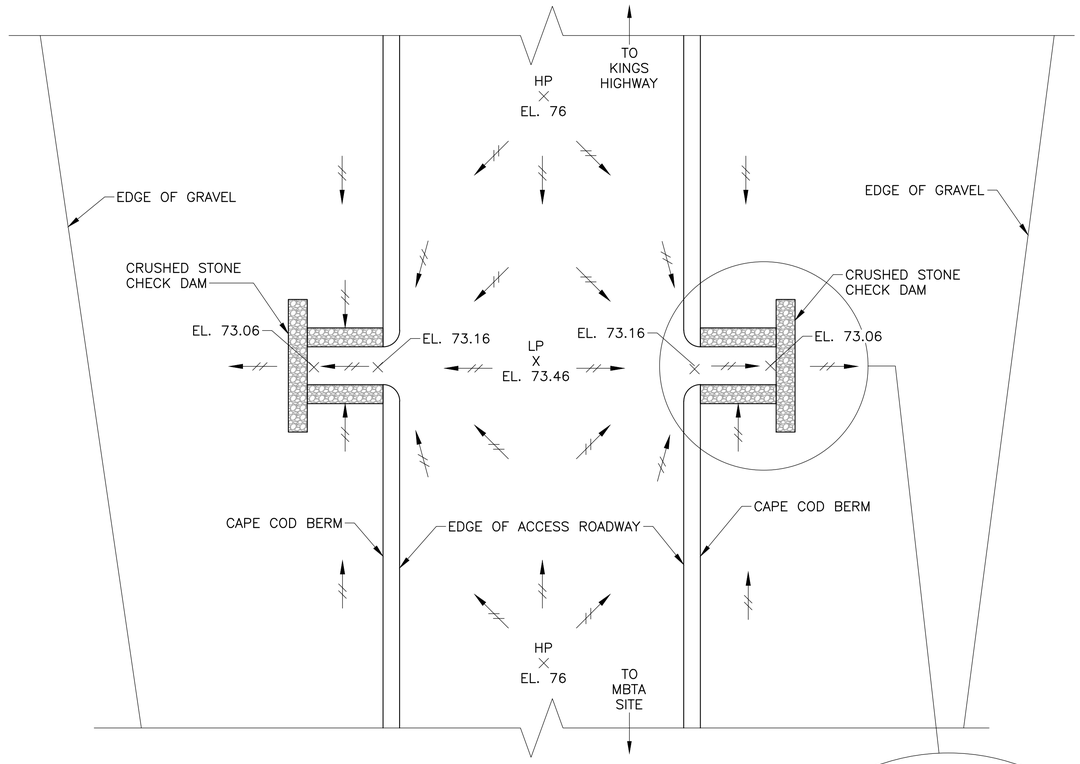

END CAP WITH LOCK SCREWS, INSTALLED FLUSH WITH FINISHED SURFACE
EXISTING 6" SQUARE DOWNSPOUT
12"
FULL–DEPTH PAVEMENT
12" SOLID WALL PVC PIPE–WYE CONNECTION
FLOW
18" DIA. CLASS V RCP PIPE. FOR INVERT ELEVATIONS SEE DRAINAGE & GRADING PLANS.

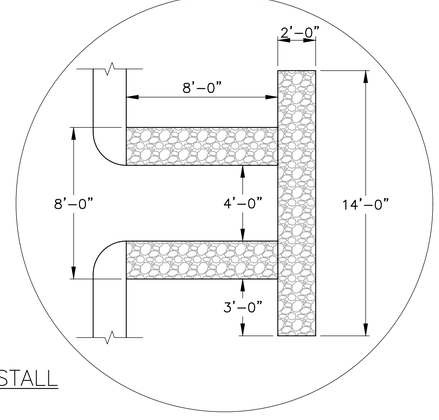
NOTE:

1. CLEAN OUT LOCATIONS SHOWN ON SITE, DRAINAGE AND GRADING PLANS.

DOWNSPOUT CONNECTION TO OUTLET PIPE DETAIL

NOT TO SCALE





THREE–SIDED CHECK DAM BMP INSTALL AT ACCESS ROADWAY DETAIL

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
9/15/21

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DRAINAGE DETAILS
SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

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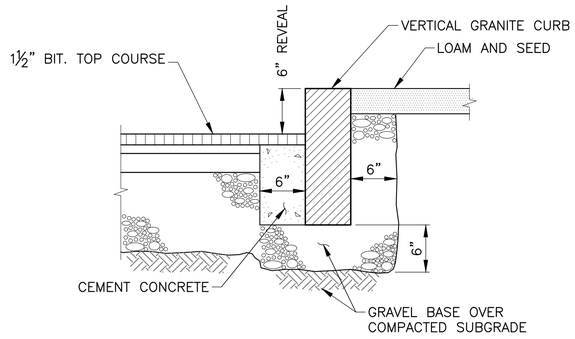
SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	EP	PJC	SHEET C-602	

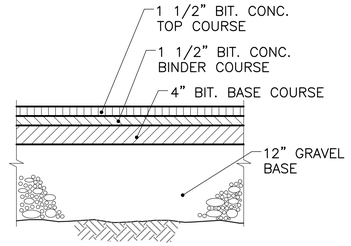
FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ C–601_602 Drainage Details.dwg
PLOT DATE: Sep 13, 2021 – 4:11pm



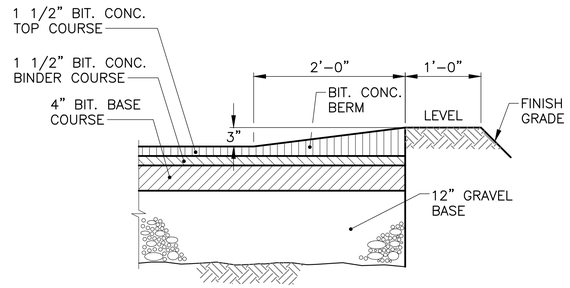
NOTE:

1. CEMENT CONCRETE SHALL BE MIN. 3000 PSI.

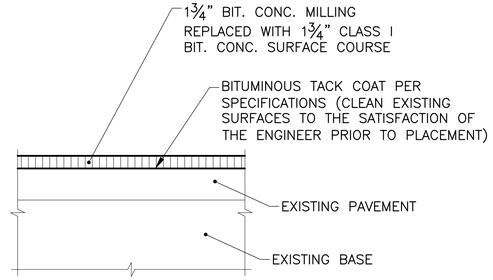
VERTICAL GRANITE CURB
NOT TO SCALE



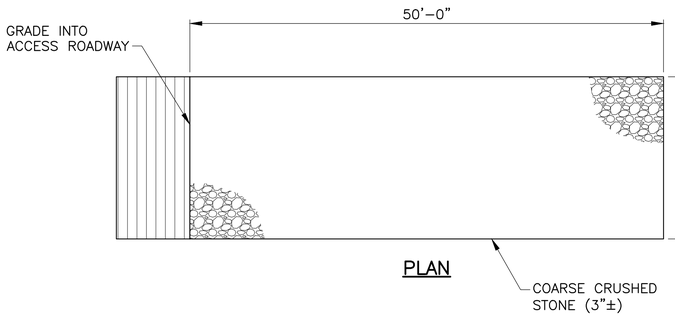
FULL DEPTH PAVEMENT DETAIL
NOT TO SCALE



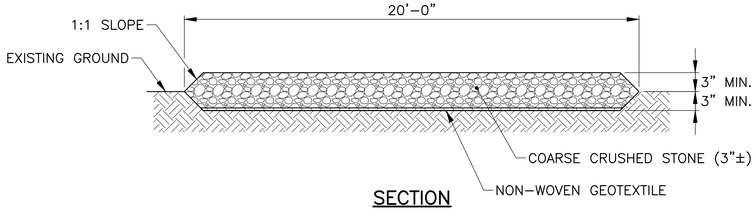
CAPE COD BERM DETAIL
NOT TO SCALE



BITUMINOUS CONCRETE OVERLAY DETAIL
NOT TO SCALE

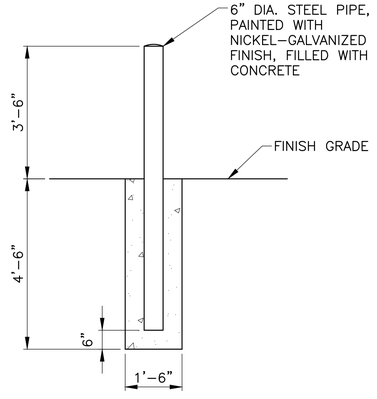


PLAN

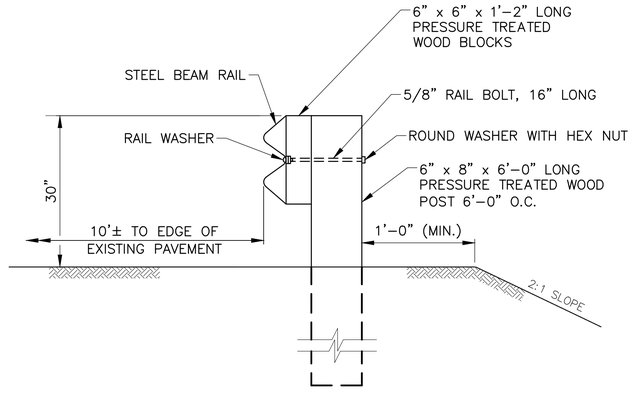


SECTION

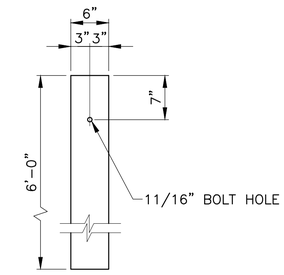
STABILIZED CONSTRUCTION ENTRANCE DETAIL
NOT TO SCALE



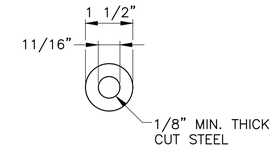
PROTECTIVE POST DETAIL
NOT TO SCALE



ELEVATION



POST DETAIL



ROUND WASHER

VEHICLE GUARDRAIL DETAIL
NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
9/15/21

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CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SITE DETAILS
SHEET 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

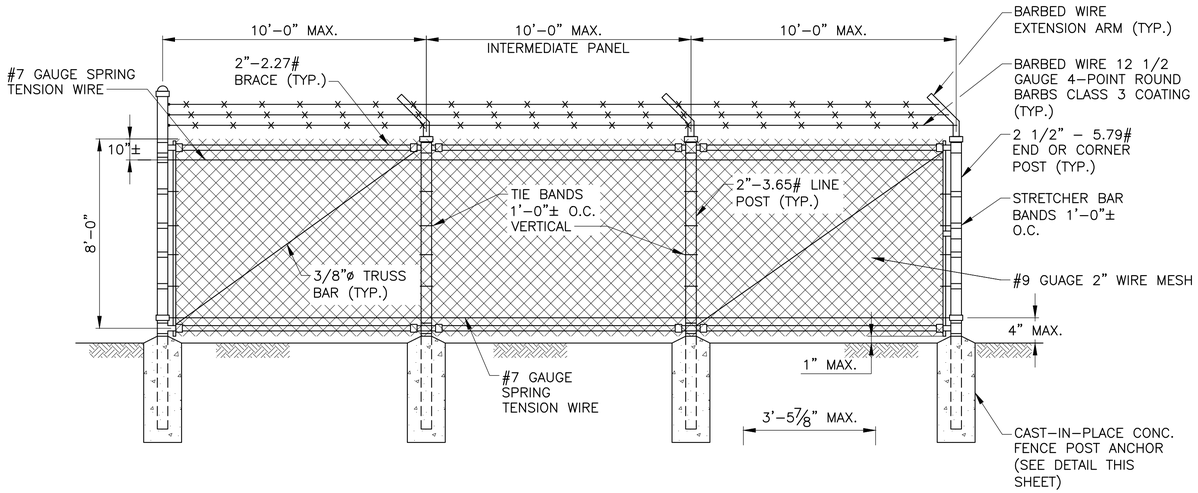
Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

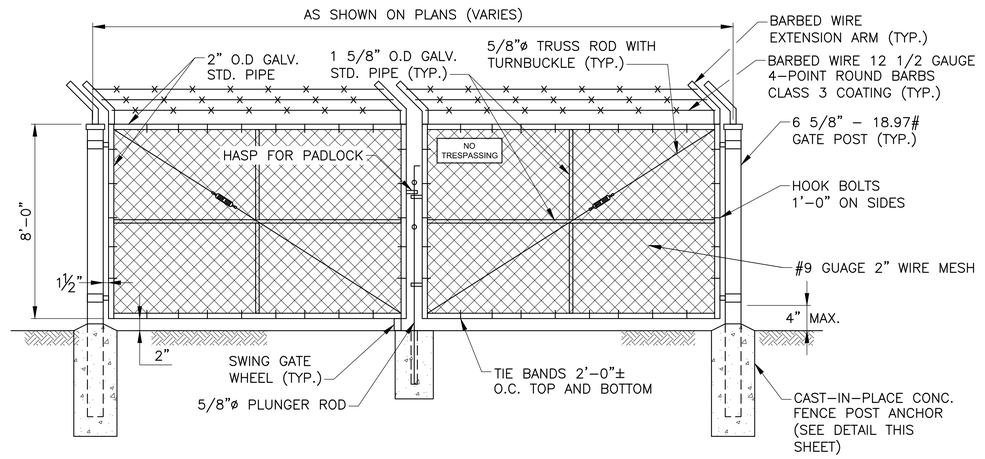
SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	DBW	PJC	SHEET C-603	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ C-603_604_SITE DETAILS.dwg
PLOT DATE: Sep 13, 2021 – 4:11pm


10'–0" MAX.
10'–0" MAX.
INTERMEDIATE PANEL
10'–0" MAX.
#7 GAUGE SPRING TENSION WIRE
2"–2.27# BRACE (TYP.)
BARBED WIRE EXTENSION ARM (TYP.)
BARBED WIRE 12 1/2 GAUGE 4–POINT ROUND BARBS CLASS 3 COATING (TYP.)
2 1/2" – 5.79# END OR CORNER POST (TYP.)
10"±
8'–0"
TIE BANDS 1'–0"± O.C. VERTICAL
2"–3.65# LINE POST (TYP.)
STRETCHER BAR BANDS 1'–0"± O.C.
3/8"ø TRUSS BAR (TYP.)
#9 GUAGE 2" WIRE MESH
4" MAX.
1" MAX.
#7 GAUGE SPRING TENSION WIRE
3'–5⅞" MAX.
CAST–IN–PLACE CONC. FENCE POST ANCHOR (SEE DETAIL THIS SHEET)

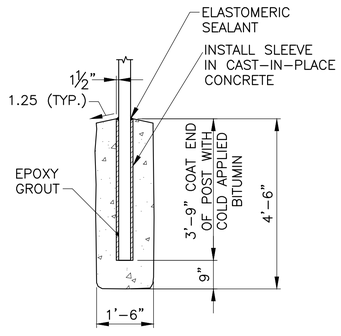
CHAIN LINK FENCE WITH BARBER WIRE

NOT TO SCALE


AS SHOWN ON PLANS (VARIES)
BARBED WIRE EXTENSION ARM (TYP.)
2" O.D GALV. STD. PIPE
1 5/8" O.D GALV. STD. PIPE (TYP.)
5/8"ø TRUSS ROD WITH TURNBUCKLE (TYP.)
BARBED WIRE 12 1/2 GAUGE 4–POINT ROUND BARBS CLASS 3 COATING (TYP.)
6 5/8" – 18.97# GATE POST (TYP.)
HASP FOR PADLOCK
NO TRESPASSING
8'–0"
HOOK BOLTS 1'–0" ON SIDES
1½"
#9 GUAGE 2" WIRE MESH
4" MAX.
2"
SWING GATE WHEEL (TYP.)
TIE BANDS 2'–0"± O.C. TOP AND BOTTOM
5/8"ø PLUNGER ROD
CAST–IN–PLACE CONC. FENCE POST ANCHOR (SEE DETAIL THIS SHEET)

8' CHAIN LINK FENCE DOUBLE GATE WITH BARBER WIRE

NOT TO SCALE



FENCE POST ANCHORED IN CONCRETE

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
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MBTA CONTRACT NO. XXXXXX

SITE DETAILS
SHEET 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

PROJECT MANAGER DATE

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SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	DBW	PJC	SHEET C-604	

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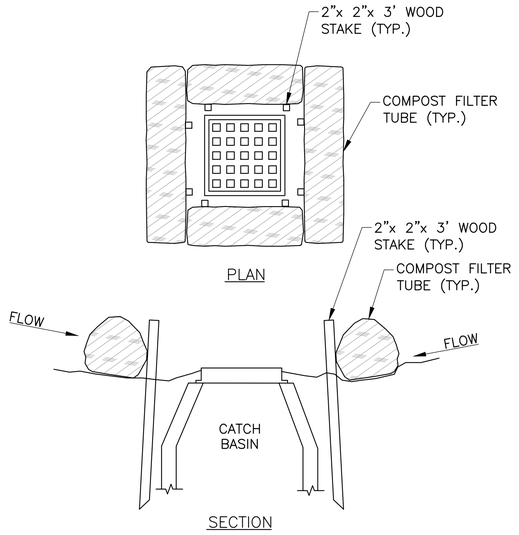
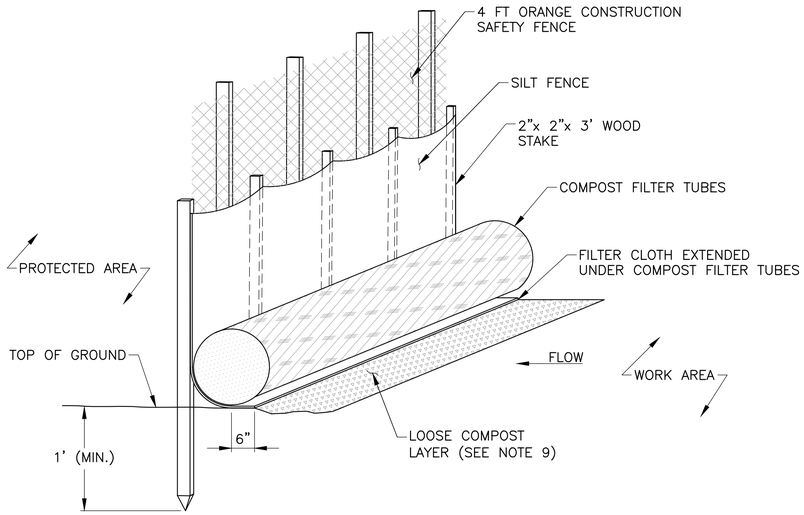


DETAIL FOR SEDIMENT CONTROL AT CATCH BASIN

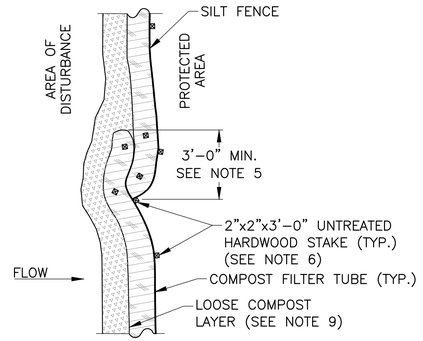
NOT TO SCALE



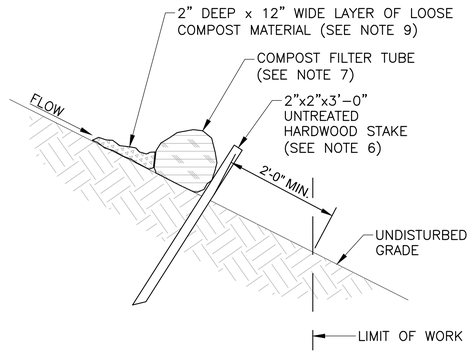
CONSTRUCTION NOTES:

1. FILTER CLOTH SHALL BE FASTENED SECURELY TO POSTS WITH WIRE TIES OR STAPLES AND POSTS SHALL BE SPACED EVERY 10 FEET.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6 INCHES AND FOLDED.
3. ENTRENCH SILT FENCE AND COMPOST FILTER TUBES
4. INSPECTIONS SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER.

EROSION AND SEDIMENT CONTROL BARRIER DETAILS



PLAN VIEW – JOIN DETAIL


2" DEEP x 12" WIDE LAYER OF LOOSE COMPOST MATERIAL (SEE NOTE 9)
COMPOST FILTER TUBE (SEE NOTE 7)
2"x2"x3'-0" UNTREATED HARDWOOD STAKE (SEE NOTE 6)
FLOW
2'-0" MIN.
UNDISTURBED GRADE
LIMIT OF WORK

COMPOST FILTER TUBE

NOT TO SCALE

COMPOST FILTER TUBE NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET FLOW OR CONCENTRATED SHEET FLOW.
3. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
4. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN–OFF.
5. PROVIDE A 3 FT. MINIMUM OVERLAP AT ENDS OF TUBES TO JOIN IN A CONTINUOUS BARRIER AND MINIMIZE UNIMPEDED FLOW.STAKE JOINING TUBES SNUGLY AGAINST EACH OTHER TO PREVENT UNFILTERED FLOW BETWEEN THEM.
6. SECURE ENDS OF TUBES WITH STAKES SPACED 18 IN. APART THROUGH TOPS OF TUBES AND UP TO 5' APART ON SIDE OF TUBES AS REQUIRED TO SECURE TUBES IN PLACE. WHEN STAKING IS NOT POSSIBLE, SUCH AS WHEN TUBES MUST BE PLACED ON PAVE,ENT, HEAVY CONCRETE OR CINDER BLOCKS CAN USED ON THE SIDE OF TUBES UP TO 5' ON SIDE OF TUBES AS REQUIRED TO SECURE TUBES IN PLACE.
7. COMPOST FILTER TUBES SHALL 12–INCH MIN. DIAMETER WITH AN EFFECTIVE HEIGHT OF 9.5 INCHES AND BE JUTE MESH OR APPROVED BIODEGRADABLE MATERIAL. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
8. TAMP TUBES IN PLACE TO ENSURE GOOD CONTACT WITH SOIL SURFACE, IT IS NOT NECESSARY TO TRENCH TUBES INTO EXISTING GRADE.
9. PLACE LOOSE COMPOST MATERIAL ON UPHILL/FLOW SIDE OF TUBES TO FILL SPACE BETWEEN SOIL SURFACE AND TUBES.

INSTALLATION DETAIL

BAG DETAIL

SILT SACK DETAIL

NOT TO SCALE

TYPICAL SECTION

SEDIMENT SETTLING BASIN DETAIL

COMMONWEALTH OF MASSACHUSETTS
THOMAS W. MORIN
CIVIL
No. 40479
REGISTERED PROFESSIONAL ENGINEER
3/15/21

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EROSION PROTECTION DETAILS

massDOT Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

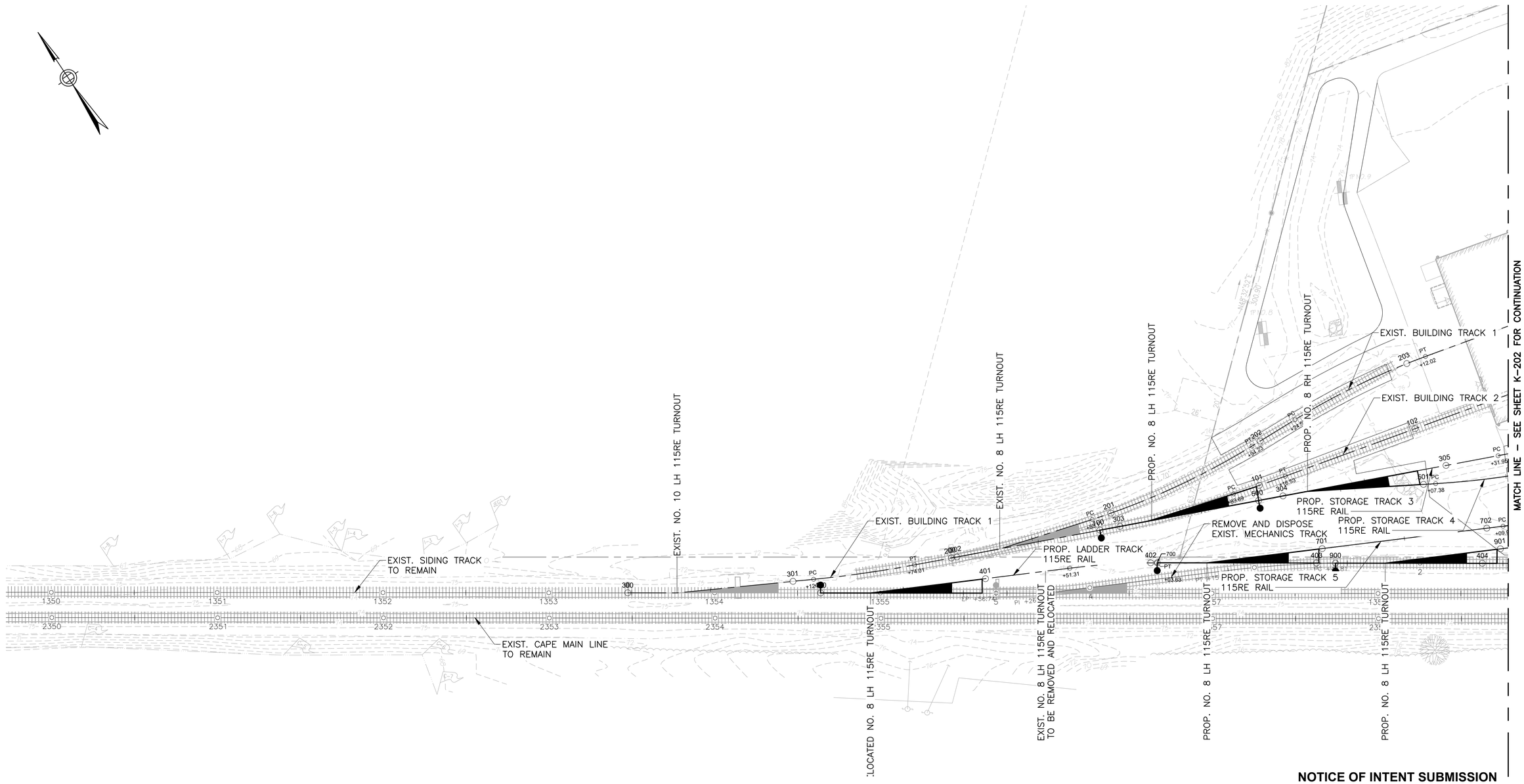
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	CWB	EP	PJC	SHEET C-605	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NO\ C–605 Erosion Control Details.dwg
PLOT DATE: Sep 13, 2021 – 4:11pm


EXIST. NO. 10 LH 115RE TURNOUT
EXIST. NO. 8 LH 115RE TURNOUT
PROP. NO. 8 LH 115RE TURNOUT
EXIST. BUILDING TRACK 1
EXIST. BUILDING TRACK 2
PROP. NO. 8 RH 115RE TURNOUT
PROP. STORAGE TRACK 3 115RE RAIL
PROP. STORAGE TRACK 4 115RE RAIL
PROP. STORAGE TRACK 5 115RE RAIL
PROP. LADDER TRACK 115RE RAIL
REMOVE AND DISPOSE EXIST. MECHANICS TRACK
EXIST. SIDING TRACK TO REMAIN
EXIST. CAPE MAIN LINE TO REMAIN
EXIST. NO. 8 LH 115RE TURNOUT TO BE REMOVED AND RELOCATED
MATCH LINE – SEE SHEET K-202 FOR CONTINUATION

PLAN
SCALE: 1' = 30'–0"

SCALE IN FEET
30 0 30 60

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PROGRESS SUBMITTAL

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Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

TRACK LAYOUT
SHEET 1

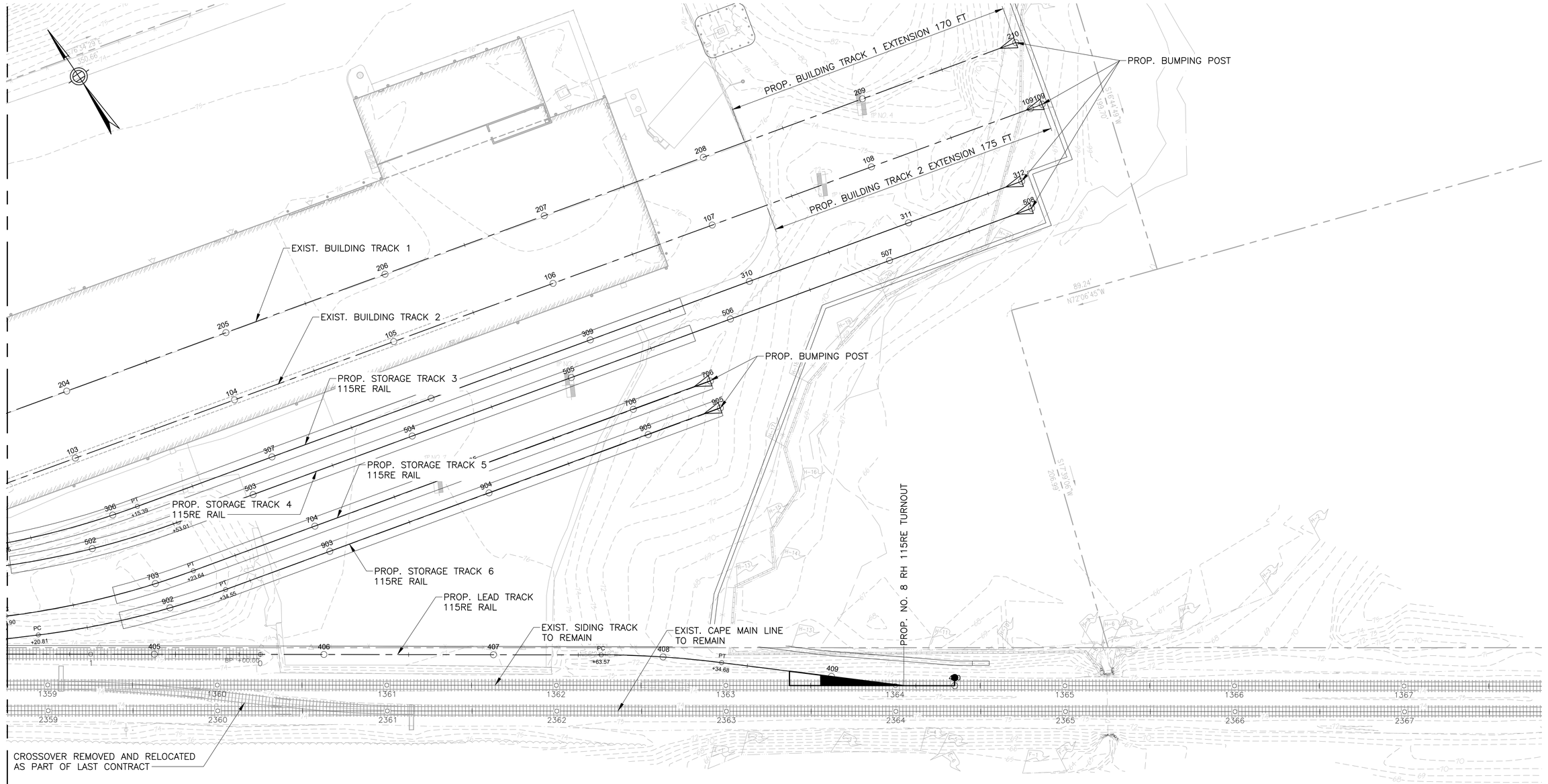
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	EW	EW	PJC	SHEET **K-201**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\703 – TRACK\30% NO\ K-201 TRACK LAYOUT.dwg
PLOT DATE: Sep 13, 2021 – 4:16pm



PLAN
SCALE: 1' = 30'–0"

SCALE IN FEET
30 0 30 60

NOTICE OF INTENT SUBMISSION

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

TRACK LAYOUT
SHEET 2

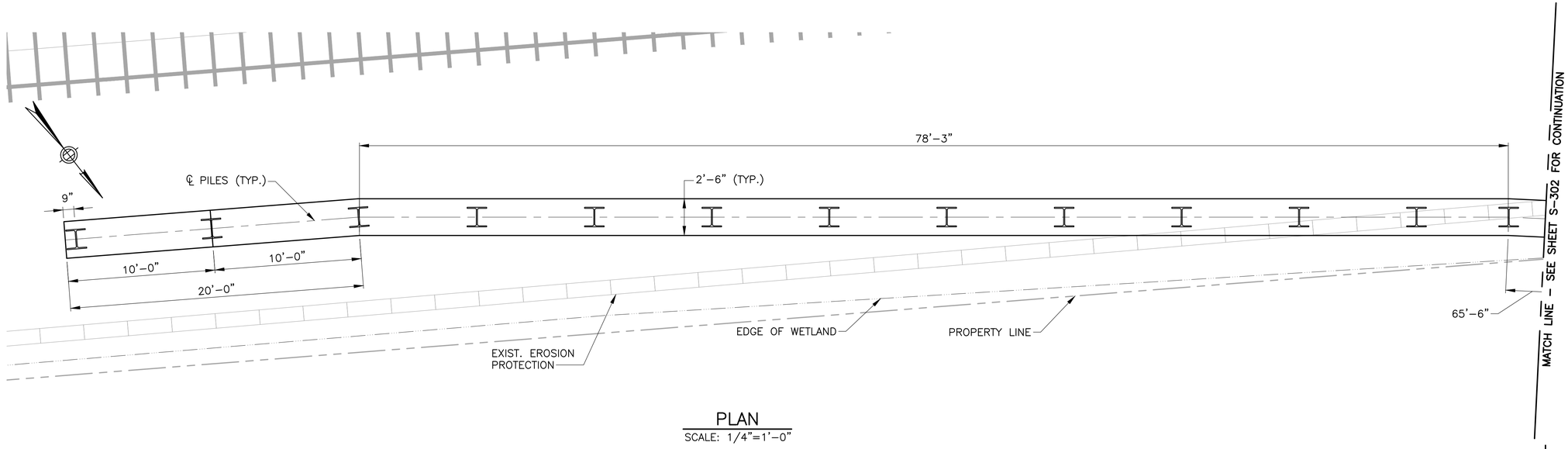
Jacobs

PROJECT MANAGER DATE

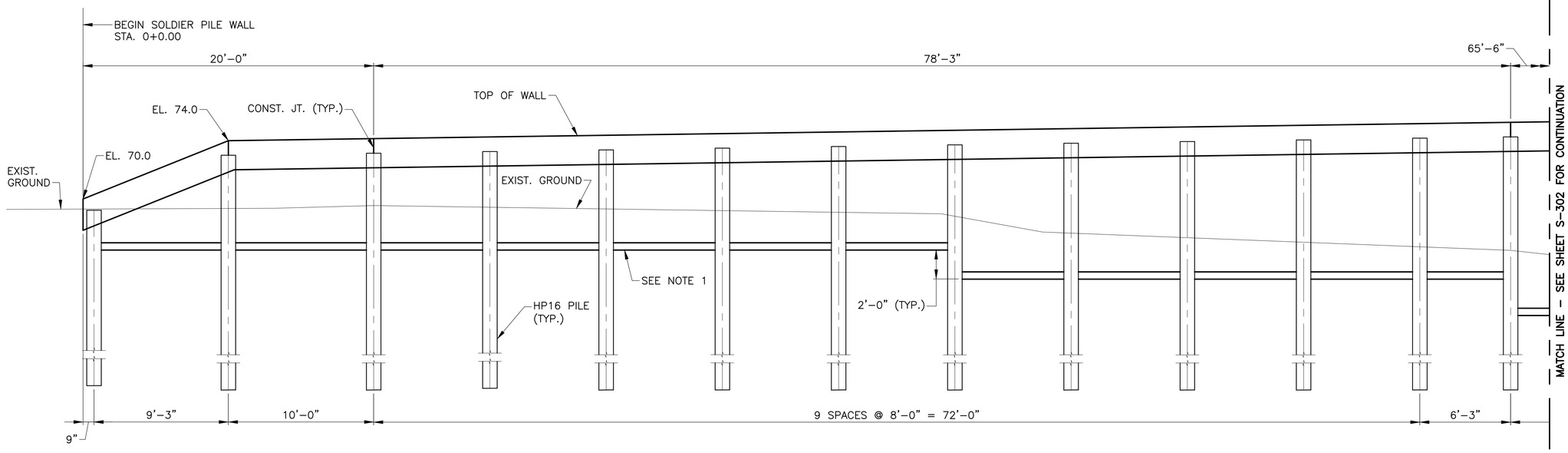
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1" = 30'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	EW	EW	PJC	SHEET K-202	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\703 – TRACK\30% NOI\ K-201 TRACK LAYOUT.dwg
PLOT DATE: Sep 13, 2021 – 4:20pm



PLAN
SCALE: 1/4"=1'–0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

NOTES:

1. PROVIDE 6" (MIN.) HIGH X PILE DEPTH UNREINFORCED CONCRETE LEVELING PAD.
2. FOR SOLDIER PILE RETAINING WALL DETAILS, SEE SHEET S–501.
3. FOR ADDITIONAL GRADING INFORMATION, SEE CIVIL PLANS.
4. PILE LOCATION SHALL BE FIELD VERIFIED BY THE CONTRACTOR. SOLDIER PILE SHALL BE CENTERED ABOUT THE CENTER OF PIPE.
5. ALL SOLDIER PIPE SHALL BE HOT–DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.

SCALE IN FEET
4 0 4 8

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 1

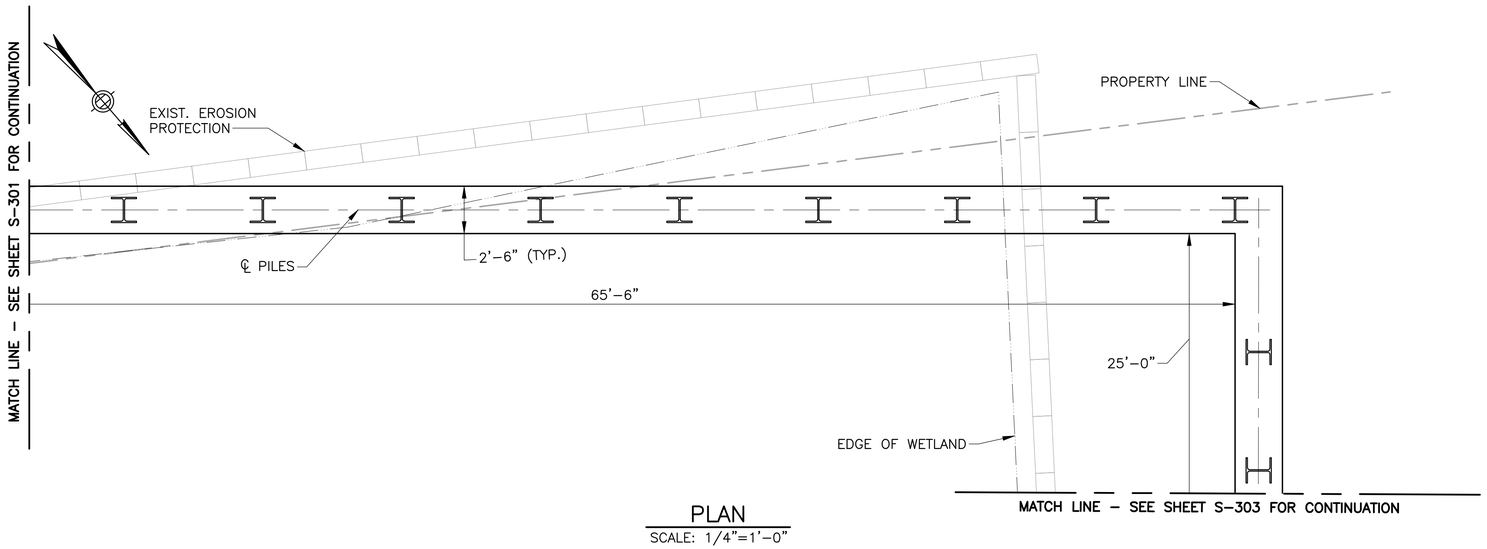
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

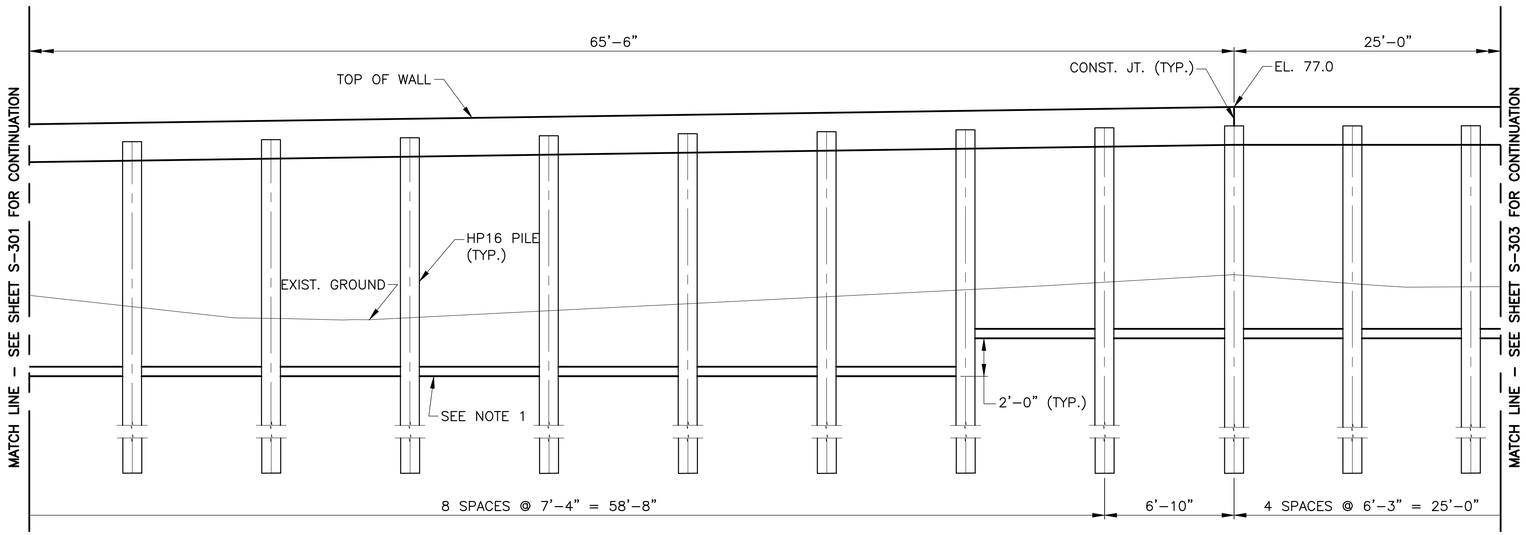
PROJECT MANAGER DATE

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	CD	MWT	SHEET S-301	

FILE NAME: P:\MBTA\2021\EZX89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NO\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:17pm



PLAN
SCALE: 1/4"=1'-0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'-0"

NOTES:

1. FOR NOTES SEE SHEET S-301.

SCALE IN FEET
4 0 4 8

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 2

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PROJECT MANAGER DATE

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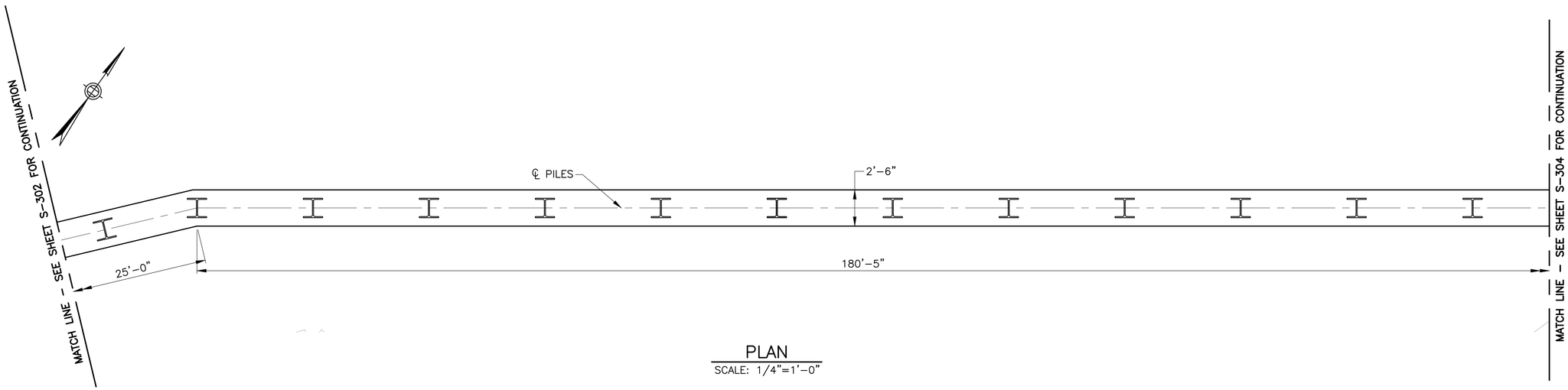
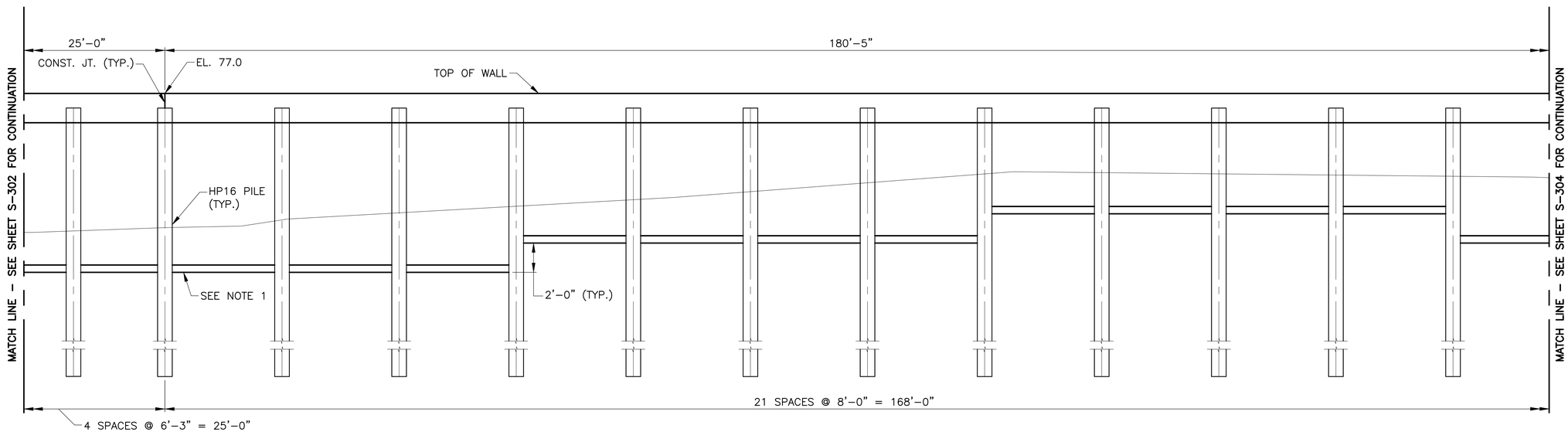
SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-302**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NOI\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:17pm



PLAN
SCALE: 1/4"=1'–0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

NOTES:

1. FOR NOTES SEE SHEET S–301.

SCALE IN FEET
4 0 4 8

PROGRESS SUBMITTAL

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Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 3

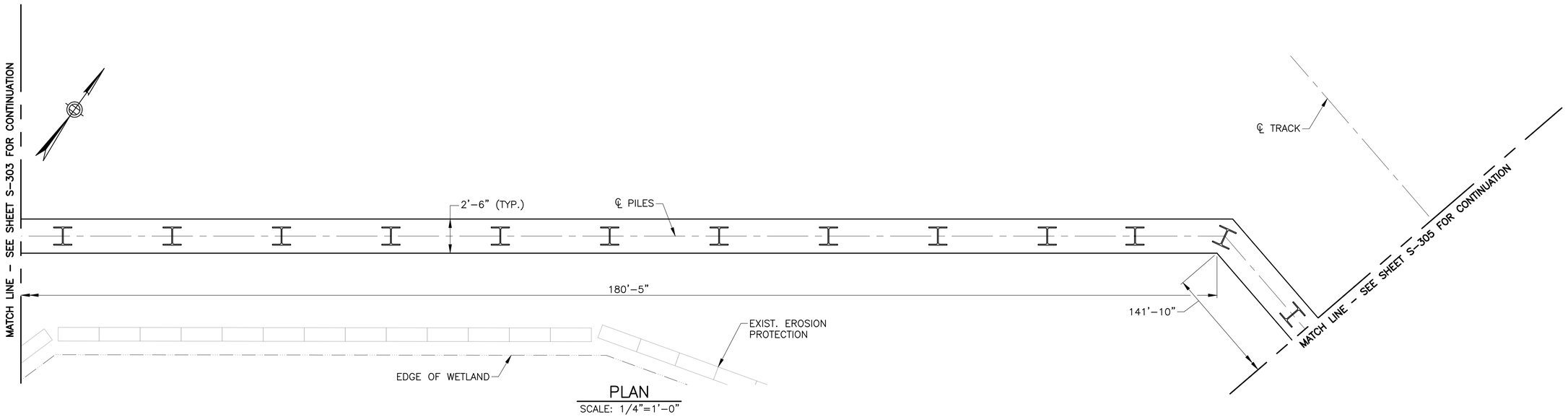
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

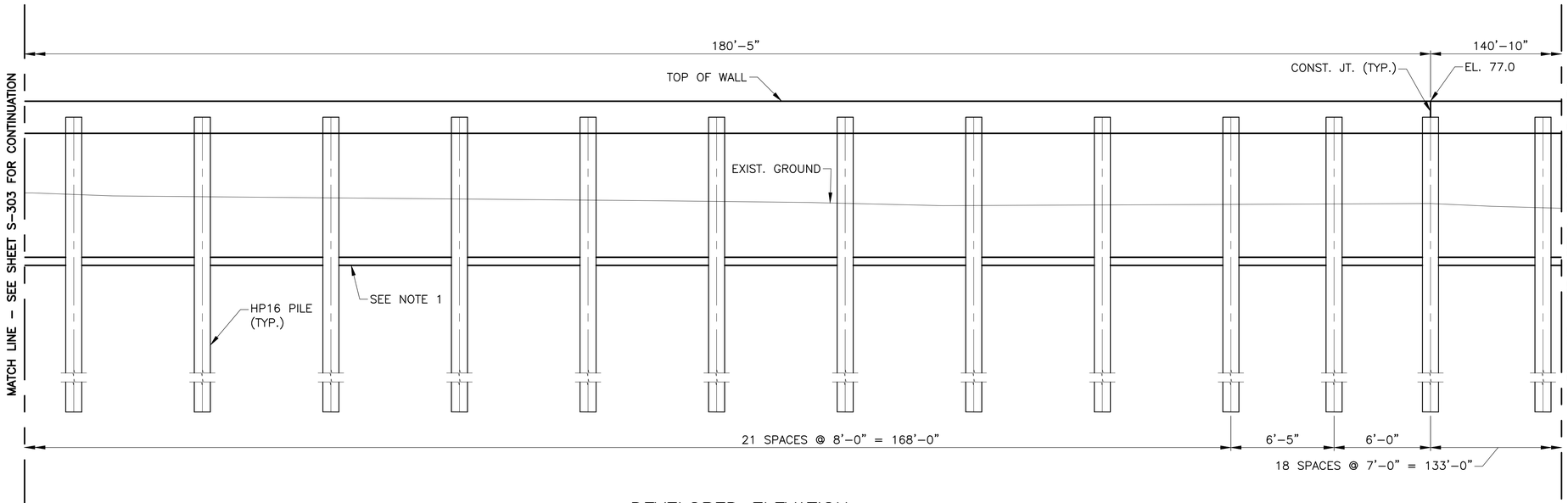
PROJECT MANAGER DATE

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-303**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NOI\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'-0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'-0"

NOTES:

1. FOR NOTES SEE SHEET S-301.

SCALE IN FEET
4 0 4 8

PROGRESS SUBMITTAL

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 4

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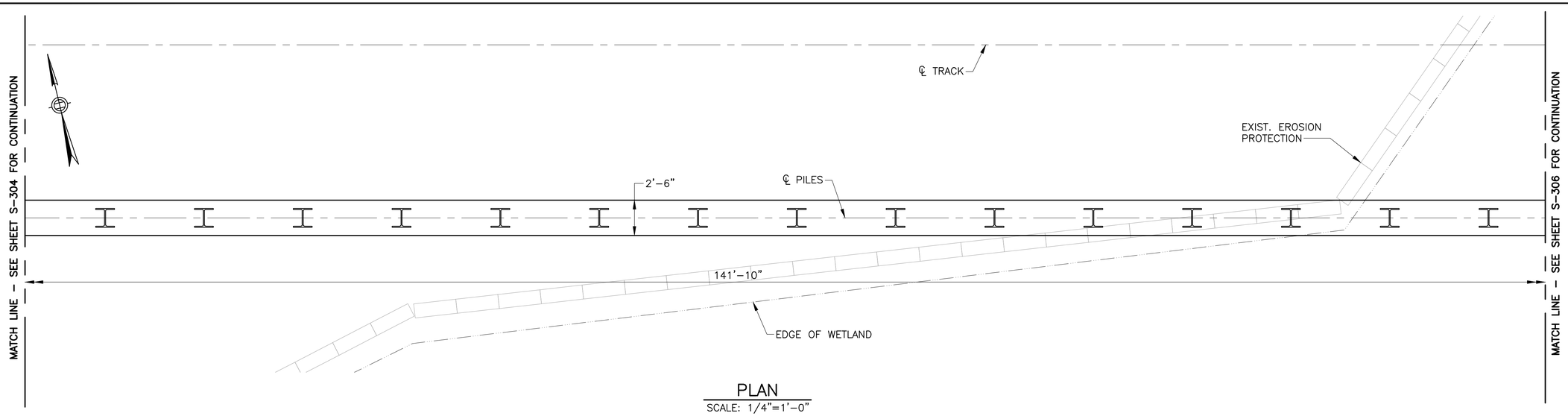
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

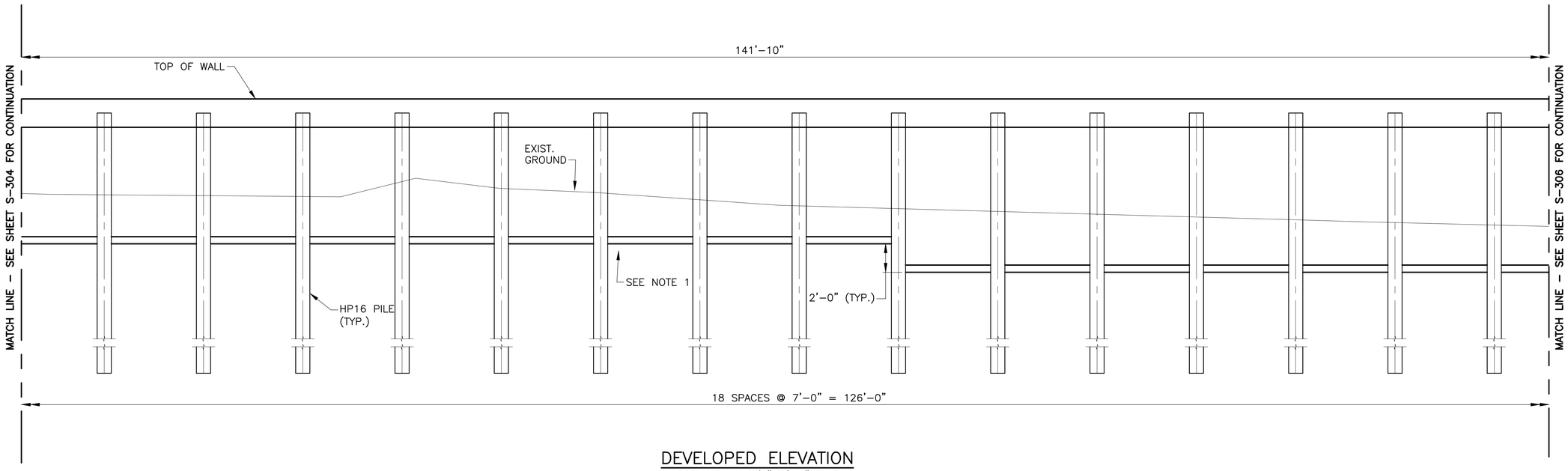
PROJECT MANAGER DATE

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-304**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NOI\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'–0"


141'–10"
TOP OF WALL
MATCH LINE – SEE SHEET S–304 FOR CONTINUATION
EXIST. GROUND
SEE NOTE 1
HP16 PILE (TYP.)
2'–0" (TYP.)
MATCH LINE – SEE SHEET S–306 FOR CONTINUATION
18 SPACES @ 7'–0" = 126'–0"

DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

NOTES:

1. FOR NOTES SEE SHEET S–301.

SCALE IN FEET
4 0 4 8

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 5

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ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

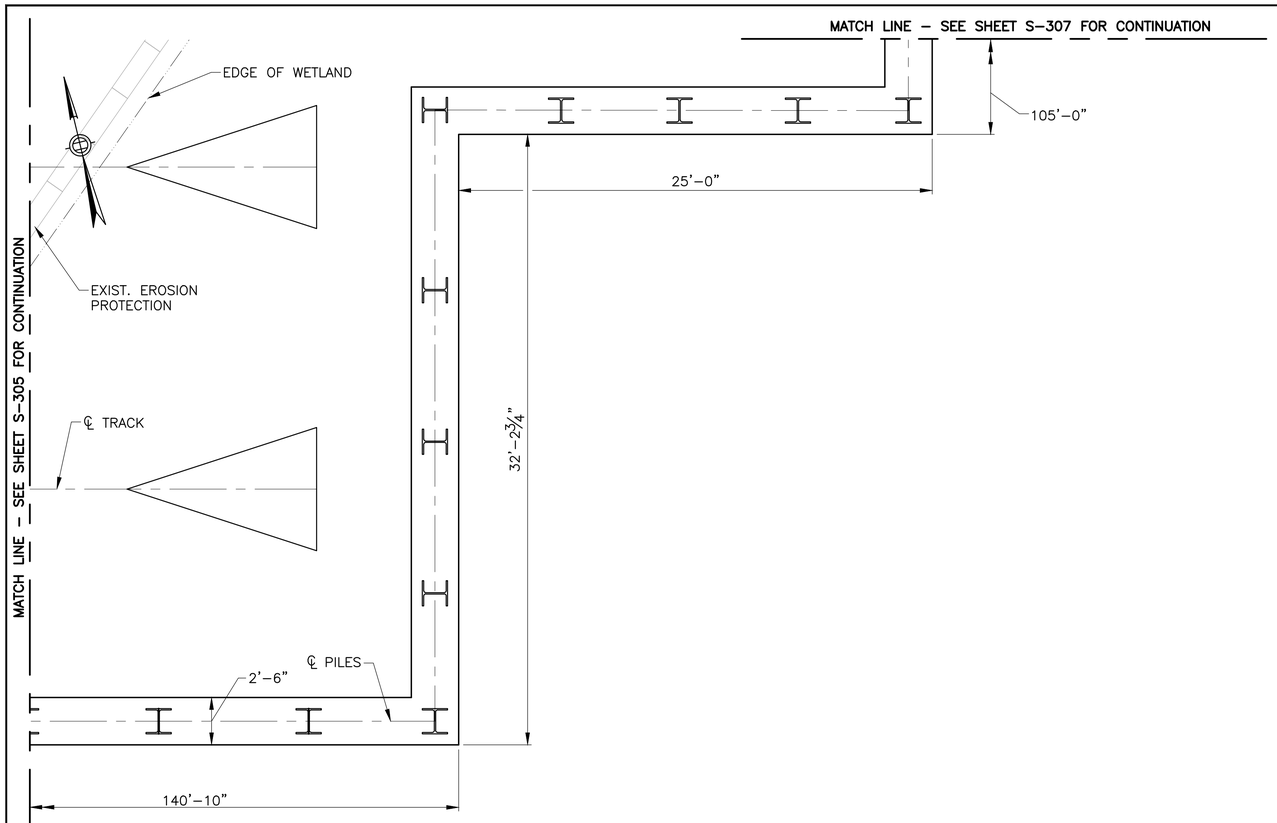
Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

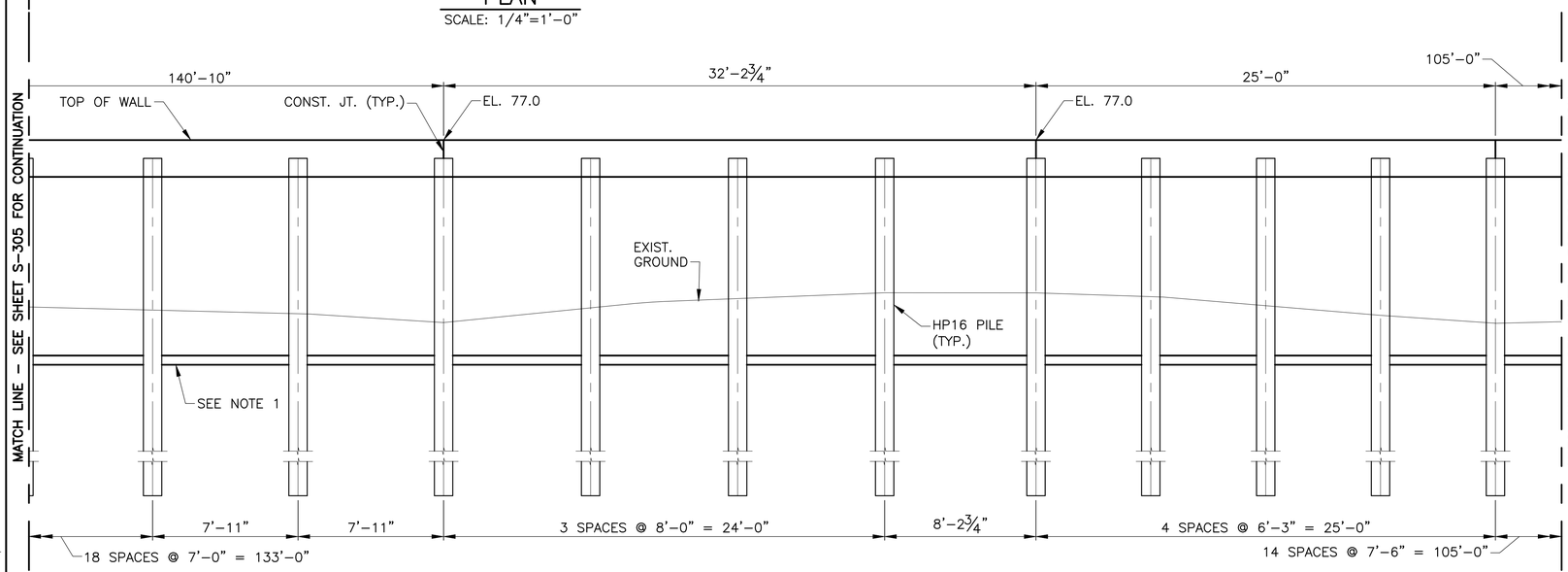
PROJECT MANAGER DATE

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-305**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NO\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'–0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

SCALE IN FEET
4 0 4 8

NOTES:
1. FOR NOTES SEE SHEET S–301.

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 6

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ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

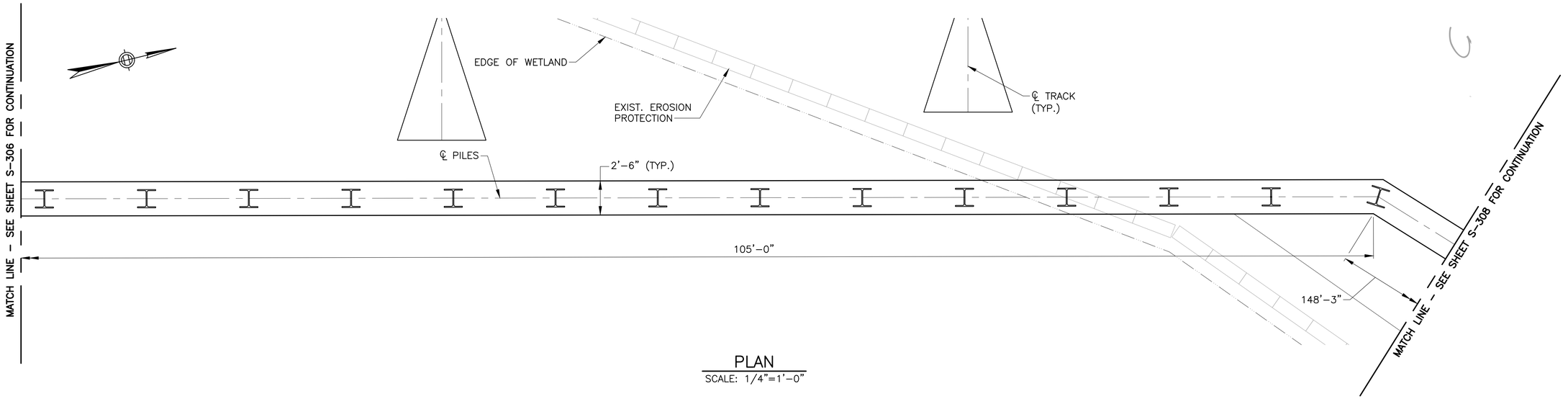
Jacobs

PROJECT MANAGER DATE

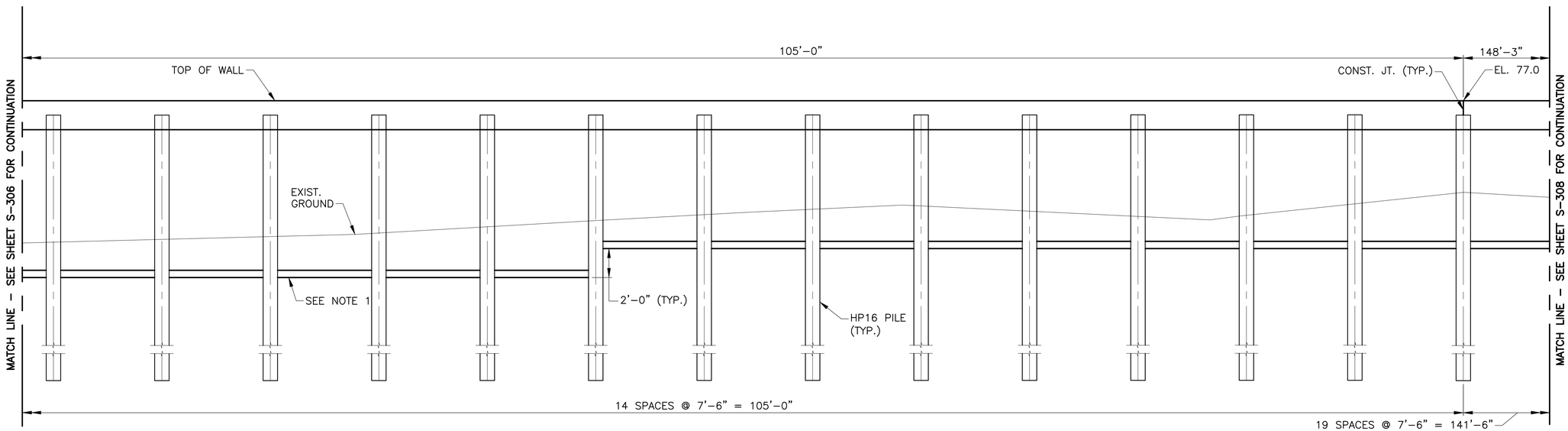
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-306**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NOI\ S–301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'-0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'-0"

NOTES:

1. FOR NOTES SEE SHEET S-301.

SCALE IN FEET
4 0 4 8

PROGRESS SUBMITTAL

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 7

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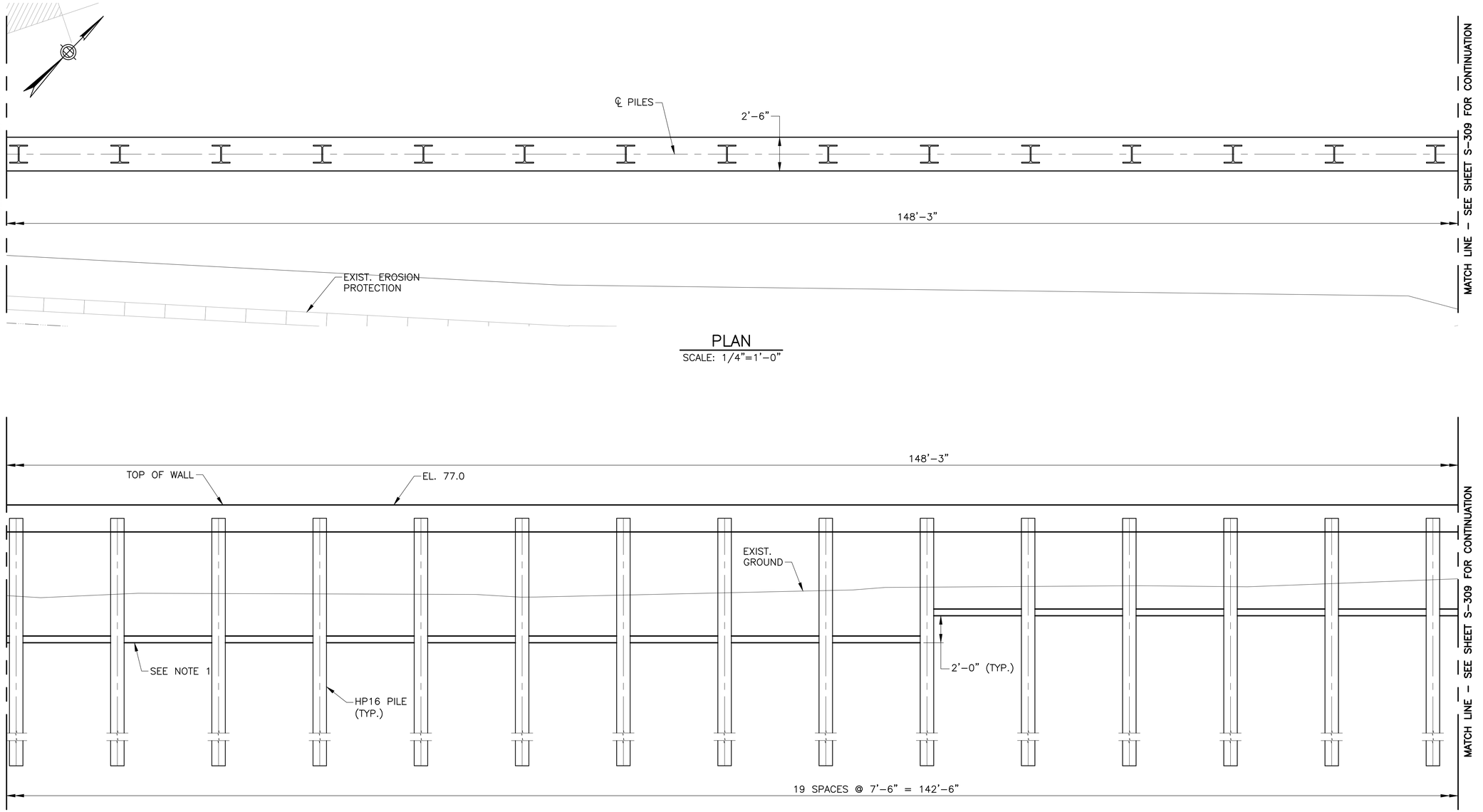
PROJECT MANAGER DATE

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-307**	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\705 – STRUCTURAL\30% NOI\ S-301_30X_SOLDIER PILE AND LAGGING PLAN AND ELEVATION.dwg
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'–0"

DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

NOTES:

1. FOR NOTES SEE SHEET S–301.

SCALE IN FEET
4 0 4 8

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 8

massDOT Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-308**	

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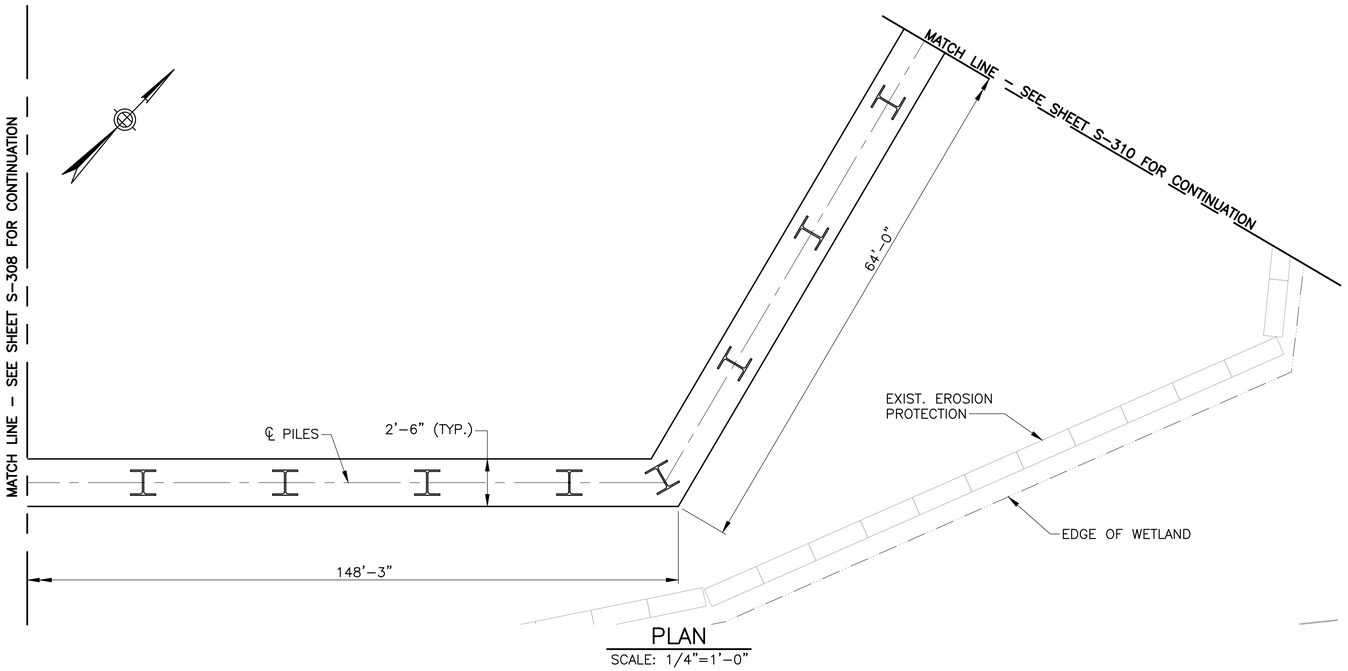
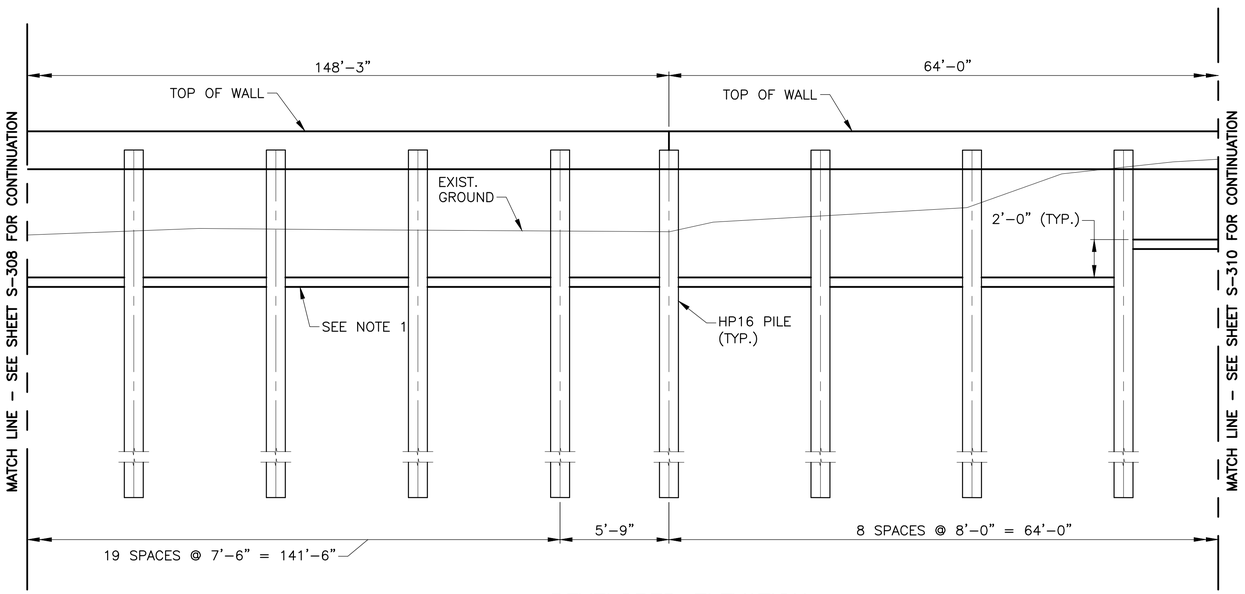
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'–0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'–0"

NOTES:
1. FOR NOTES SEE SHEET S–301.

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

SCALE IN FEET
4 0 4 8

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 9

PROJECT MANAGER		DATE			
SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-309**	

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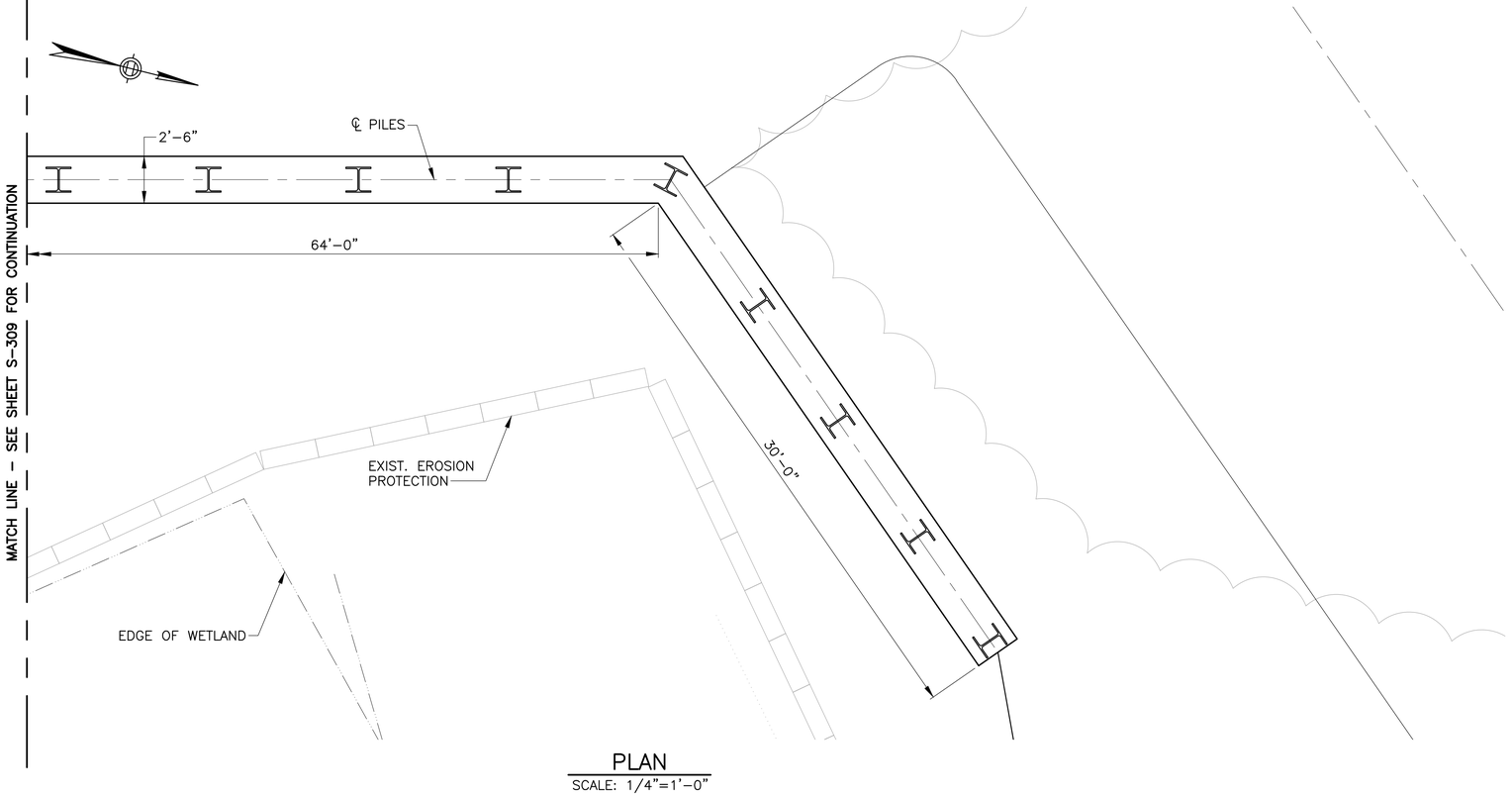
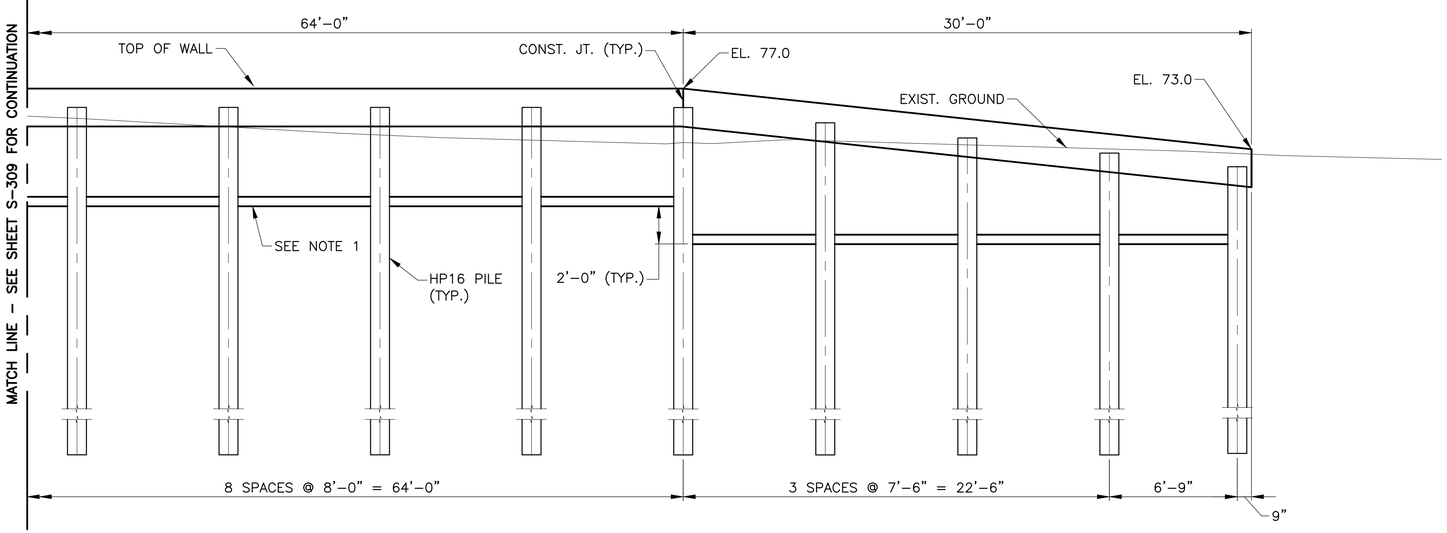
PLOT DATE: Sep 13, 2021 – 4:18pm



PLAN
SCALE: 1/4"=1'-0"



DEVELOPED ELEVATION
SCALE: 1/4"=1'-0"

SCALE IN FEET
4 0 4 8

NOTES:
1. FOR NOTES SEE SHEET S-301.

PROGRESS SUBMITTAL

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NOTICE OF INTENT SUBMISSION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SOLDIER PILE RETAINING WALL PLAN AND ELEVATION SHEET 10

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

PROJECT MANAGER DATE

SCALE: 1/4"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-310**	

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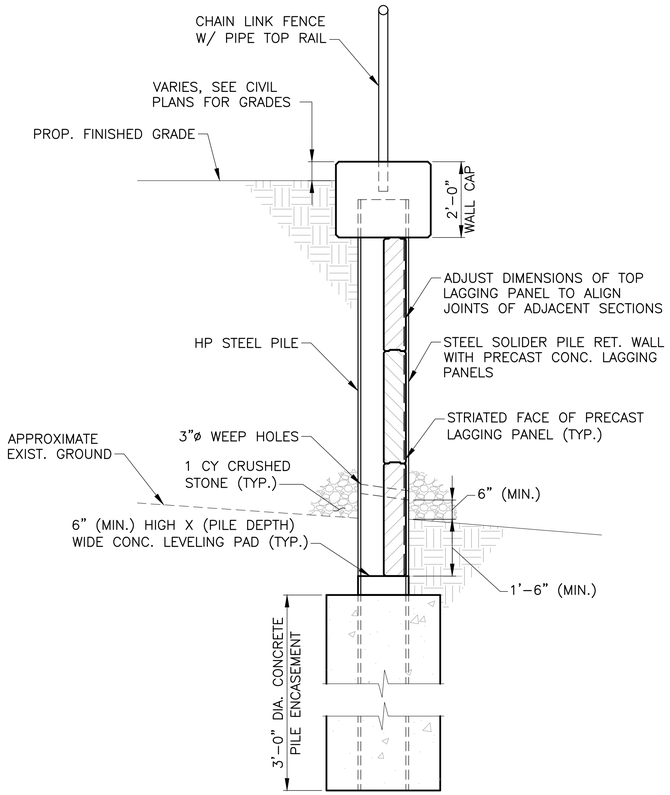
PLOT DATE: Sep 13, 2021 – 4:19pm



TYPICAL RETAINING WALL SECTION

SCALE: 1/2"=1'-0"

NOTES:

1. FOR SOLDIER PILE AND RETAINING WALL PLAN AND ELEVATION, SEE SHEETS S-301 THRU S-301.
2. DESIGN OF ALL PANEL LIFTING DEVICE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE INCLUDED ON THE SHOP DRAWINGS. ALL HARDWARE SHALL BE GALVANIZED AND ALL VOIDS OR POCKETS SHALL BE FILLED WITH NON-SHRINK GROUT.
3. INSTALL A MINIMUM 4 FEET WIDE GEOCOMPOSITE SHEET DRAIN BEHIND THE PRECAST CONCRETE PANELS (COVERED WEEP HOLES). BACKFILL THE SPACE (VOID) BEHIND LAGGING WITH GRAVEL AS SPECIFIED.

SCALE IN FEET

4 3 2 1 0 4

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

NOTICE OF INTENT SUBMISSION

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

SECTIONS AND DETAILS

SCALE: 1/2"=1'-0"	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	TQ	XXX	XXX	SHEET **S-501**	

FILE NAME: P:\MBTA\2021\E2X89804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\705 - STRUCTURAL\30% NOI\ S-501_SECTIONS AND DETAILS.dwg
PLOT DATE: Sep 13, 2021 - 4:19pm

APPENDIX C – Stormwater Management Report and Checklist

Stormwater Management Report

MBTA Rochester Project
45 Kings Hwy
Maintenance Facility
Rochester, Massachusetts

September 15, 2021

Prepared for:
Massachusetts Bay Transportation Authority

Prepared by:
JACOBS

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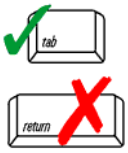
MADEP Stormwater Report Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☐ Redevelopment
- ☑ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☑ No new untreated discharges
- ☑ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☑ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☑ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☑ Soil Analysis provided.

☑ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☑ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☑ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☑ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☑ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☑ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☑ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☑ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☑ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☑ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☑ The BMP is sized (and calculations provided) based on:

- ☑ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☑ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☑ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☑ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☑ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☑ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☑ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☑ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☑ Name of the stormwater management system owners;
- ☑ Party responsible for operation and maintenance;
- ☑ Schedule for implementation of routine and non-routine maintenance tasks;
- ☑ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☑ Description and delineation of public safety features;
- ☑ Estimated operation and maintenance budget; and
- ☑ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☑ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Section 1:
Project Summary

The Massachusetts Bay Transportation Authority (MBTA) proposes to re-habilitate and add some storage tracks to this existing five acre facility located at 45 Kings Highway off of Route 28 in the Town of Rochester, Massachusetts. In addition, new ground storage areas and a new driveway providing a secondary means of emergency access from Kings Highway are planned to be constructed within this property boundary to meet the long-term commuter rail expansion needs of this facility. (refer to the east side grey and orange shaded areas shown on the Track Improvements (Overall Site) Plan drawing in this report). This planned ground-storage area and new accessway improvements will be constructed within the "New Development" area along this east side of the project site. They will be contained within the MBTA property line boundary limits without encroachment onto adjacent abutting properties. They will function to be compatible with the current site's existing rail track yard area behind the maintenance building, the building itself and existing access-parking elements surrounding the building which collectively comprise what herein is referred to as the "Redevelopment" area of the site property. (refer to both the white and grey shaded areas surrounding the building as shown in the Overall Site Plan drawing in Section 1 of this report).

A defined number of specific improvements are proposed to be completed within the "Redevelopment" portion of this project. They include simple milling and re-overlay of the existing parking lot area (light grey shaded area in the plan) and restriping the parking spaces accordingly following the repaving work. This existing paved parking surface will not be expanded in size. The resurfacing will address minor cracks and rutting and provide this parking area with another 30 plus years of crack free surfaces all around this building. The parking and sidewalk surfaces around the perimeter of this building will maintain the same footprint and surface slopes which will preserve the historic flow pattern of runoff throughout this area of the site. As such, there is a net balance in the parking lot area associated with this repaving work.

The building footprint (white area in the plan) will also remain the same in overall size without physical expansion of this structure. Therefore, the pre and post construction roof runoff surface area within this redeveloped portion of the project site will remain unchanged. With the installation of four ballast supported storage tracks within the redevelopment area directly behind the building, the MBTA will also require ground surface storage of equipment containers, which will make up for the existing on ground storage area displaced by these storage track installations within this track yard redevelopment area behind the building. These redevelopment improvements as shown within this area of the property will be necessary to achieve these project site needs from a railroad maintenance operations standpoint. There will also be a necessary improvement made to the building's existing roof downspout collection system which requires minor reconfiguration and regrading modifications to the existing receiving collection area. Otherwise the only other functional changes are internal to the building where maintenance tracks within the structure itself are currently being constructed.

The "New Development" portion of the site (east side dark grey shaded area shown in plan) will involve extension of the two maintenance and repair tracks outward from the inside of this structure toward the east side of the property. The lengths of these two tracks have been predetermined to accommodate the longest anticipated train car sets that will need to be stationary on these tracks during down time and maintenance times of operation. A proposed grade wall will need to be constructed to both securely contain and define the outer limits on the east side of this MBTA property within which the new development work must be provided to build out the necessary improvements for new tracks, secure storage and secondary driveway. As noted earlier, this proposed driveway access feature (dark grey in the plan) shown connecting to the existing Kings Highway roadway edge is necessary to provide a critical secondary means of egress in the case of emergencies at the property while the existing driveway to Kings Highway is maintained to function as the main entrance as it does today.

100% of the new development runoff on the east side of the property will be effectively collected and treated separately by the treatment sources as proposed to be installed. This is achieved in the design approach whereby the proposed surface grading works in combination with compatible closed inlet deep sump catch basins, treatment forebay and detention basin drainage collection system within this new east side area of the site property. This stormwater system is dedicated to the new development area runoff collection and will not allow for any capture of nor intermixing with the redevelopment site area runoff. This assures complete separation of the new development and redevelopment areas of stormwater management for surface runoff collection in the full build condition.

The proposed drainage, stormwater management and erosion control provisions outlined in this report as intended to be incorporated to support these noted project improvements were designed to collect, convey, attenuate, treat and control recharge storm event runoff volumes throughout both the redeveloped and new development areas of the project property. The analyses provided documents that the design of these elements either meet or exceed the state stormwater regulations to the greatest extent practicable and will have no adverse effect on ground nor downstream conditions from this property as all of the site runoff is managed on property by design for water quantity and water quality to meet State Standards requirements.

MBTA Rochester Maintenance Facility

Wetland Impact Calcs

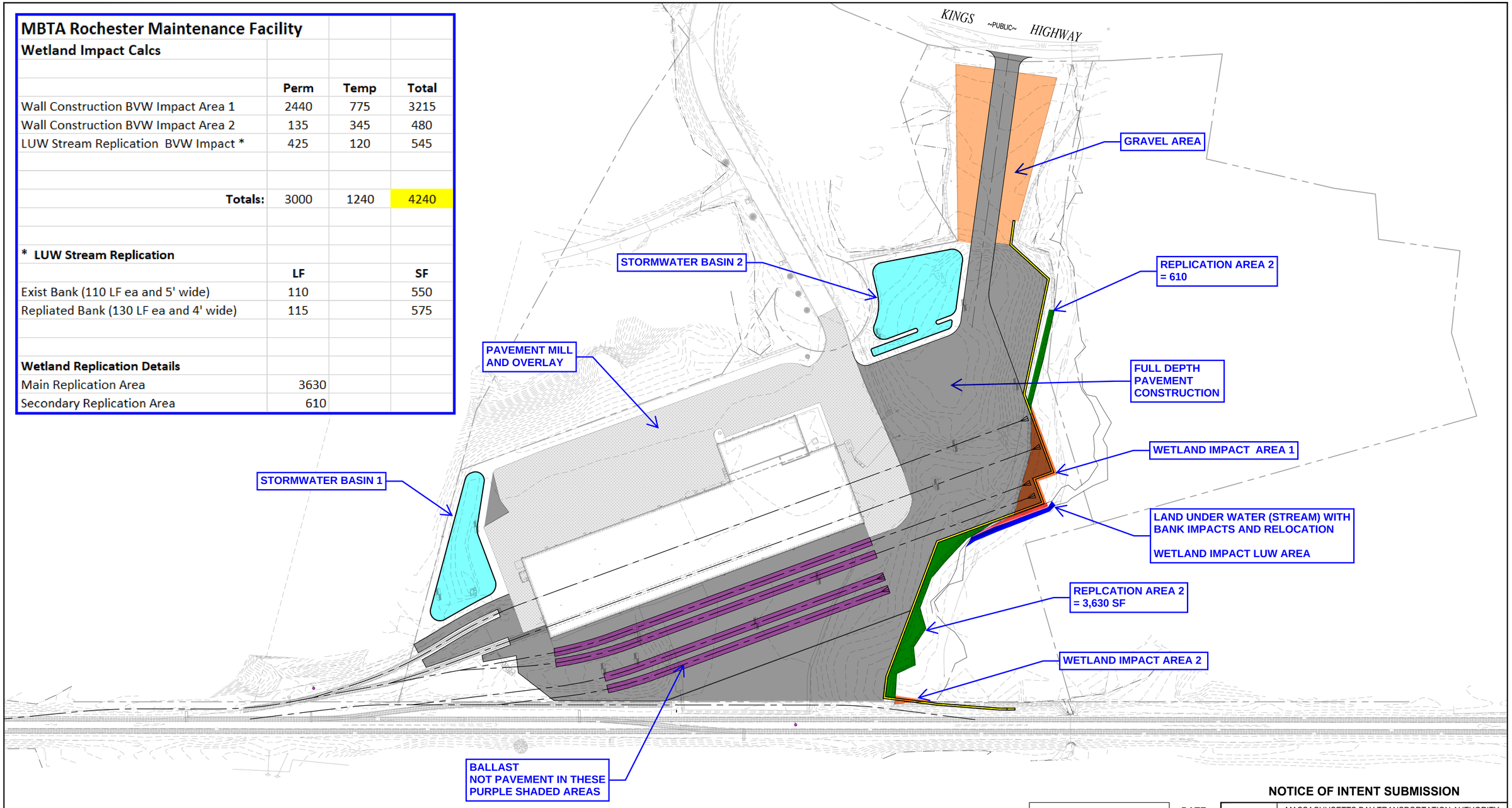
	Perm	Temp	Total
Wall Construction BVW Impact Area 1	2440	775	3215
Wall Construction BVW Impact Area 2	135	345	480
LUW Stream Replication BVW Impact *	425	120	545
Totals:	3000	1240	4240

*** LUW Stream Replication**

	LF		SF
Exist Bank (110 LF ea and 5' wide)	110		550
Repliated Bank (130 LF ea and 4' wide)	115		575

Wetland Replication Details

Main Replication Area	3630
Secondary Replication Area	610


KINGS ~PUBLIC~ HIGHWAY
GRAVEL AREA
STORMWATER BASIN 2
REPLICATION AREA 2 = 610
PAVEMENT MILL AND OVERLAY
FULL DEPTH PAVEMENT CONSTRUCTION
STORMWATER BASIN 1
WETLAND IMPACT AREA 1
LAND UNDER WATER (STREAM) WITH BANK IMPACTS AND RELOCATION
WETLAND IMPACT LUW AREA
REPLCATION AREA 2 = 3,630 SF
WETLAND IMPACT AREA 2
BALLAST NOT PAVEMENT IN THESE PURPLE SHADED AREAS

SCALE IN FEET

60 0 60 120

NOTICE OF INTENT SUBMISSION

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

DATE: 8/23/21

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

OVERALL SITE PLAN

massDOT Massachusetts Department of Transportation

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

PROJECT MANAGER DATE

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

SCALE: 1" = 60'	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE:	DBW	DBW	PJC	SHEET C-201	

FILE NAME: P:\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NOI\ C-201_SITE PLAN.dwg
PLOT DATE: Aug 23, 2021 – 8:11am

Section 2:
Existing Conditions

Summary

The project site is in the town of Rochester which is owned and operated by MBTA. It is currently utilized as a railroad yard and is the location of a Maintenance Facility which is undergoing for internal renovations and is programmed for storage tracks expansion. The property is comprised of main track, storage and approach track into the 360 foot long steel maintenance building with a roof runoff area of 28,800 square feet. This building has been used for many years to perform sheltered maintenance on both car sets and individual rail cars and engines. It has all standard building utilities including water, sewer, power and communications which are fed to the building from Kings Highway via the existing 600 foot long entrance driveway which is paved and grades back to the Kings Highway connection entrance. From the point where this driveway high point elevation connects into the existing parking lot and in all three other directions outward toward the property limit fences, the site was evaluated on its site conditions and topography to determine the relevant sub-catchment drainage areas which define the existing hydrologic conditions on this property. The list of sub-catchment areas identified below are graphically shown on size and location within the property on Figure 1 in Appendix A of this report.

Hydrologic Information

For the existing conditions hydrologic analysis, the site was divided into the following Existing Drainage Areas ***(See Appendix A - Figure 1):***

AREA "E-1 IMPERV" – north half of the maintenance building roof surface and the entire existing parking and sidewalk surfaces which sheet flow into the finger swale which runs along the north pavement edge from east end to west end and into the existing west end collection area

AREA "E-2 PERV" – Existing soil embankment flow down area E2

AREA "E-3 IMPERV" – south half of the maintenance building roof surface collected existing buried downspout collecting pipes into the existing basin behind the maintenance building

AREA "E-4 IMPV"- Existing impervious ground surface flowing toward adjacent wetland

AREA "E-4 PERV" – Existing partial-pervious ground surface area E4 around Existing Detention Basin

AREA "Ex G 1" – Existing pervious Ground Area 1 with in-soil-flow migrating down toward adjacent wetland

AREA "Ex G 2" – Existing pervious Ground Area 2 with in-soil flow migrating down toward adjacent wetland

AREA "Ex TREES" – Existing Tree Area overland flowing toward adjacent wetland

AREA "Ex FS" – Entire length of existing finger swale from NE to NW parking edge corners

Table 1:
Existing Conditions Hydrologic Data

Description (Existing Drainage Area)	Connection & Discharge	*DP Point of Analysis #	Area Sq. Ft.	Curve Number	Time of Concentration (minutes)
E-1 IMPERV	Into EX FS then Into Ex Basin #1	1	60,331	98	1.6
E-2 PERV	Into EX FS then Into Ex Basin #1	1	59,939	69	2.8
E-3 IMPERV	Into 12" pipe then Back of Bldg Basin and piped into Ex Basin #1	1	14,400	98	1.6
E-4 IMPV	Into Ex wetland 1	3	20,930	98	4.6
E-4 PERV	Into back of Bldg Basin and piped into Ex Basin #1	1	49,136	79	52.0
EX G1	Into Ex wetland 2	3	19,080	65	18.9
EX G2	Into Ex wetland 2	3	19,080	65	18.9
EX TREES	Into Ex wetland 3	3	57,263	60	138.1
EX FS	Into Exist Basin #1	1	405,456	50	117.6

*Design Point #1 is existing basin #1 at west end of finger swale EX FS providing infiltration
* Design Point #3 is the existing tree area and existing downstream wetlands along east side of the site which naturally provide infiltration through the native subsoils as groundwater recharge

(refer to the Existing Conditions Watershed Plan – Figure 1 in Appendix A)

Section 3:
Proposed Conditions

Summary

The proposed conditions include re-paving of the existing parking lot, re-habilitation of existing tracks and addition of storage/maintenance tracks at this existing facility. In addition, gravel surface ground storage areas (orange areas shown on plan) and new paved area and accessway (grey areas shown in plan) will be constructed to make the site fully operational.

In terms of drainage and stormwater management in the Redevelopment area of the project site, the building northside downspouts will remain as they are as splash downs onto the repaved parking surface which all sheet flow down the existing paved parking area and into the finger swale (node EX FS) along its north edge. The southside downspouts are currently piped together below ground and empty into the existing detention basin (node EX. RRB) which will be displaced by the construction of the storage tracks along the back of the maintenance building. The existing ground piping will be removed and new 18" reinforced concrete Class V piping will be installed to convey this south half building roof runoff volume into the expanded existing basin #1 (node EDB) which is currently hydraulically connected to the existing basin needing to be infilled to allow for the track installations. All paved ground surfaces which exist and are to be maintained; including a small, weed covered triangular ground area near basin #1 where prior pavement has long since cracked under equipment storage loading, crumbled away and is in need of replacement. All of these surfaces will continue to sheet flow and be collected as they always have been in both the finger swale and within the expanded existing basin #1.

The storage tracks to be installed in the existing track yard area behind the building (node PR-BTR) within this southside Redevelopment portion of the site property will all be supported on an 18 inch deep layer of standard railroad number 4 AREMA stone ballast. This stone is 3-4 inch in diameter and is highly pervious with large void ratio and will promote a pervious surface condition over these newly constructed track areas. It will also receive surface flow from the repaved area (node P4-IMPERV) immediately adjacent to these new storage tracks without resulting in area wide flooding. A backup overflow drainage collection system is included at the low grade point elevation of this area between the existing tracks and the new storage tracks as a means to collect any and all excess runoff volume resulting from the highest critical storm event as a safeguard not to flood this track yard thereby maintaining operations during the worst storm condition. This closed inlet and pipe system will also provide an inline pre-treatment benefit by way of deep sump collection of sediments prior to this overflow volume reaching receiving Detention Basin #1. The overflow catch basin at the front end of this system will serve to relieve the track yard area of any accumulating sheet flow runoff during the worst 100 year storm that would saturate the ballast stone voids up to the top of stone elevation. Prior to this occurring, this deep sump catch basin with its grate set at this slightly lower elevation than the top of stone/top of RR ties will have already begun to accept some inflow, pre-treat and process this excess volume ahead of the peak hour of the 100 year storm thereby keeping the track rails above water. In the hours that follow this storm, the stacked runoff volume will slowly begin to recede and normalize with the lower groundwater as it normalizes during the follow-on dry

weather hours following this major storm. This is the reason for the need of this overflow system and how it will serve to function. This method of ballast area collection and flood protection is common in railroad yard design practice as was recently permitted and successfully installed at the MBTA's Wachusett Layover in Westminster Massachusetts.

In the New Development area of this project site, a new paved area (node PP5 IMPV & RPE4 IMPV) and proposed access drive (node PRDW) (grey areas shown in plan) will be constructed as asphalt surfaces. The accumulated surface runoff has been modeled and quantified for all the critical design storms and a drainage system composed of 4 deep sump catch basins discharging collected pretreated runoff into collection basin with treatment forebay (node PRDB) is sized to receive, contain, treat, and process the cumulative stored volume for controlled recharge back to lower groundwater with and emergency overflow structure provided for the 100 year storm event. The groundwater will be the ultimate downstream collection receiver as is the case in the existing conditions where groundwater ultimately receives the surface flow through the area wide pervious and tree area soils.

The runoff volume that will originate on the surface of the secondary means of access driveway (node PRDW) will have to be handled locally with small and simple BMP installations each comprised of 3 sided stone check dams to be situated on both sides of this access drive at the mid-length low-point location. This is required because the driveway runoff at the mid length of this access drive cannot be gravity-piped up hill into the location of the proposed detention basin #2. Therefore, detention and settlement of runoff sediments will be provided, contained and filtered at the low mid-point of the accessway within these check dam installations. These two permanent installations will only need to manage this small localized volume of runoff and will perform as installed to receive, contain, detain and treat this small storm volume accordingly. These check dam features will be installed at the mid-length low-point on both edges of this secondary access driveway to effectively intercept this surface runoff, allow it to filter through and settle within these three -sided stone check dam shaped areas on both sides of the road to allow for separation of floating litter and filtering of immersed sediment by way of detaining this flow volume to settle out and then allow for a slow controlled weeping of this pre-treated volume to bleed through permeable geotextile fabric embedded within the stone dams installed on the wetland sides of these three sided BMPs. This will result in a cleaner volume allowed to permeate out of these BMPs thus allowing for slow migration of this filtered volume into the ground just offset from the adjacent wetland areas on both sides of the accessway following the trapping of floating and settling sediment. This BMP treatment has been used at other sites with low midpoint profiles which cannot be gravity-piped back into up-gradient forebay and basin systems. This is a simple and efficient method to collect, manage, treat and control-release small volumes of filter-treated runoff at low points along access driveways.

These stormwater management features as designed and modeled in this report function to contain 100% of project site runoff and is intended to protect from onsite and offsite flooding from occurring with the full build condition as proposed and detailed in the project plans. The Hydrologic analyses in this report and the following table summarize the results.

Hydrologic Information

For the proposed conditions hydrologic analysis, the site was divided into the following Proposed Drainage Areas ***(See Appendix B - Figure 2):***

AREA "E-1 IMPERV" – north half of the maintenance building roof surface and the entire existing parking and sidewalk surfaces which sheet flow into the finger swale which runs along the north pavement edge from east end to west end and into the existing west end collection area

AREA "E-2 PERV" – Existing soil embankment flow down area E2

AREA "E-3 IMPERV" – south half of the maintenance building roof surface collected existing buried downspout collecting pipes into the existing basin behind the maintenance building which in the proposed condition will be piped into the expanded basin area node EDB

AREA "P-4 IMPERV" – Proposed repaved ground surface area P4 around new stone ballast-supported storage tracks

AREA "PR-BTR" – Entire area of the ballast supported storage tracks behind the building

AREA "RPE4 IMPV" – Repaved impervious ground surface around new storage tracks

AREA "PP 5 IMPV" – Proposed paved area between New Tracks and Prop Detention Basin#2

AREA "PR DW" – Proposed driveway to be paved within Existing Ground Area 2 node EXG2

AREA "Ex FS" – Entire length of existing finger swale from NE to NW parking edge corners

Table 2:
Proposed Conditions Hydrologic Data

Description (Proposed Drainage Area)	Connection & Discharge	*DP Point of Analysis #	Area Sq. Ft.	Curve Number	Time of Concentration (minutes)
E-1 IMPERV	Into EX FS then Into Expanded Basin #1 then groundwater recharge	1	61,081	98	1.6

Description (Proposed Drainage Area)	Connection & Discharge	*DP Point of Analysis #	Area Sq. Ft.	Curve Number	Time of Concentration (minutes)
E-2 PERV	Into EX FS then Into Expanded Basin #1 then groundwater recharge	1	59,189	69	2.8
E-3 IMPERV	Into new 18" pipe then Into Expanded Basin #1 then groundwater recharge	1	14,400	98	1.6
P-4 IMPERV	Into new track ballast voids then groundwater recharge overflow piped into Basin #1	2	15,225	98	6.0
PR-BTR	Into new track ballast voids then groundwater recharge	2	37,697	50	31.3
RPE4 IMPV	Into new 12" pipe then Into new Basin #2 then groundwater recharge	3	20,930	98	4.6
PP5 IMPV	Into new 12" pipe then Into new Basin #2 then groundwater recharge	3	49,438	98	6.1
PR DW	Into Ex wetland 2 via groundwater recharge	**	6,987	98	3.1
EX FS	Into Expanded Basin #1 then groundwater recharge	1	405,456	50	120.7

*Design Point #1 is expanded existing basin #1 at west end of finger swale EX FS which both provide 100% drawdown and increases controlled recharge to groundwater within 72 hours
*Design Point #2 is the pervious ground collection area behind the maintenance building which the voids in ballast stone provide 100% drawdown and groundwater recharge within 72 hours
*Design Point #3 is the new detention recharge basin to be constructed on the east side of site which provides 100% drawdown and controlled recharge to groundwater within 72 hours
**PW DW is lower in elevation and cannot be connected to Basin #2 therefore runoff is collected and treated via check dams at driveway edges and then slow released to groundwater

(refer to the Proposed Conditions Watershed Plan – Figure 2 in Appendix A)

Section 4:
Hydrologic/Hydraulic Analysis

Hydrologic Analysis

The rainfall-runoff modeling analysis at this site for both existing and proposed conditions has been evaluated for the 2-, 10- and 100-year storm events. Rainfall volumes used for the analysis were based on the Cornell NRCC Rainfall Rates Type III, 24-hour storm event for Rochester Massachusetts; were 3.2, 4.9 and 8.9 inches, respectively. Runoff coefficients for the pre and post-development conditions, as previously shown in Tables 1 and 2 respectively, were determined using Technical Release 55 (TR-55) methodology as provided in HydroCAD.

Drainage areas used in the analysis as were described in previous sections of this report are shown on both the Existing and Proposed Watershed Figures. The HydroCAD model is based on the Technical Release 20 (TR-20) Model for Project Formulation Hydrology. Detailed printouts of the HydroCAD analyses (included in Appendix.) Table 3 presents a summary of the existing and proposed conditions peak discharge rates. The results clearly confirm that the storm water volumes for all critical storm events up through and including the 100 year milestone storm under proposed rehabilitation / full-build conditions are 100% managed by the proposed infiltration drainage systems as designed without exceeding the existing peak discharge rates. The net differences between the existing and proposed discharge rates in each critical storm event represents a beneficial reduction in direct discharge managed by the proposed basins which will function to attenuate and control-recharge runoff volume down into the lower receiving groundwater water resulting from both the expansion of Basin #1 and construction of New Forebay and Detention-Recharge Basin #2 to be installed to address water quantity and water quality. The volumes detained permeate through the lower native sandy ground soil within 72 hours to migrate through this highly draining in situ-soil down to groundwater level in direction toward the existing wetlands as a treated volume while preserving the runoff flow patterns of this project site.

Table 3:
Peak Discharge Rates Contributing from Pre & Post Subcatchment Areas (cfs)

Point of Analysis	Pre & Post Construction	2-year Storm Event	10-year Storm Event	100-year Event
Design Point "1"	Existing	4.87	7.26	15.43
Expanded Basin #1	Proposed	4.87	3.87	9.22
Design Point "2"	Existing	1.94	4.29	8.52
Area behind Bldg	Proposed	0.83	1.27	2.32
Design Point "3"	Existing	1.55	3.19	7.85
New Basin #2	Proposed	1.00	1.34	5.40

Design point #1 is the expanded existing basin #1 at west end of existing finger swale EX FS providing controlled recharge from Basin #1 to lower groundwater via subsoil migration
Design Point #2 is the pervious ground collection area behind the maintenance building with controlled recharge to be provided via the high void storage within the ballast stone
Design Point #3 is the new detention recharge basin to be constructed on the east side of the site providing treated recharge from this Basin #2 to the wetland area via groundwater migration

(refer to the Proposed Conditions Watershed Plan – Figure 1 in Appendix A)

Conclusions:

As can be seen in the results of the hydrologic analyses, the discharge rates and their associated runoff volumes collected throughout the limits of the project site in the full build out condition have been managed such that the post condition discharges to the receiving areas and also the adjacent wetlands have been kept in balance and otherwise not exceeded.

This has been achieved by the design of the proposed detention basins at the end run of the surface collection flow paths in both the redeveloped and the new developed areas of the project.

Therefore the proposed drainage system improvements will provide the desired results for managing the storm runoff volumes and discharge rates while providing valuable groundwater recharge without introducing adverse surface ground flooding and will function in accordance with low impact development practices for stormwater management in conformance with the applicable design guidance regulations.

Section 5:
Stormwater Management Regulations

Compliance with the 10 stormwater management standards, cited in the Massachusetts Department of Environmental Protection Stormwater Management Handbook, is evaluated below:

Standard 1: Untreated Stormwater Discharges
No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Storm water collection and pre-treatment for all the critical storm events will be provided with the proposed drainage systems.

Standard 2: Peak Rate Control and Flood Prevention
Storm water management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Post-development peak discharges rates will not exceed the pre-development peak discharge rates.
(See "Appendix B")

Standard 3: Recharge to Ground Water
Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, storm water best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the storm water management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Storm Water Handbook.

The stormwater management system was designed to infiltrate the required recharge volume in accordance with the Massachusetts Stormwater Handbook.
(See "Appendix E").

Standard 4: 80% TSS Removal
Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

a) *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.*

b) *Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and*
c) *Pretreatment is provided in accordance with the Massachusetts*

This requirement will be achieved via the proposed deep sump catch basins and stormwater maintenance.
(See "Appendix C").

Standard 5: Higher Potential Pollutant Loads (HPPL)
For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L.c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

There is no recognized potential for petroleum spills from the trains or the conventional commuter vehicles utilizing the parking lot on a daily basis. Therefore, this site is not considered a land use with higher potential pollutant loads. As such a source control and pollution prevention plan is not required for this site location. Otherwise, the MBTA will act as required in accordance with their Spill Containment and Management Policy that is applicable at all their facilities throughout the State and the region.

Standard 6: Critical Area
Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1. or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. [1] *Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.*

[1] If an NPDES Construction General Permit or Multi-Sector General Permit is required for a discharge to an ORW, DEP must approve the Stormwater Pollution Prevention Plan (SWPPP).

The project site is not nearby any known Zone II, interim well heads existing in close proximity to; nor down-gradient of this site. All applicable proposed water quality protection measures have been recommended to the greatest extent practicable in order generally improve existing conditions and to likewise minimize and or avoid impacts to the down-gradient receiving water east of the proposed footprint areas of the project site.

Standard 7: Redevelopment Project Requirement
A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

A portion of this project qualifies as a redevelopment project as the proposed improvements are rehabilitation and replacement based without any expansive new construction required to achieve the goals or project needs. Therefore, for a portion of the project the proposed storm water management improvements have been designed to be implemented to the maximum extent practicable in order to improve upon existing conditions from a water quantity and quality standpoint.

Standard 8: Erosion and Sediment Control
A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The project will be constructed with all applicable erosion control BMP measures as are detailed in the Massachusetts Stormwater Design Manual which are applicable to this project site

Standard 9: Operation and Maintenance
A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

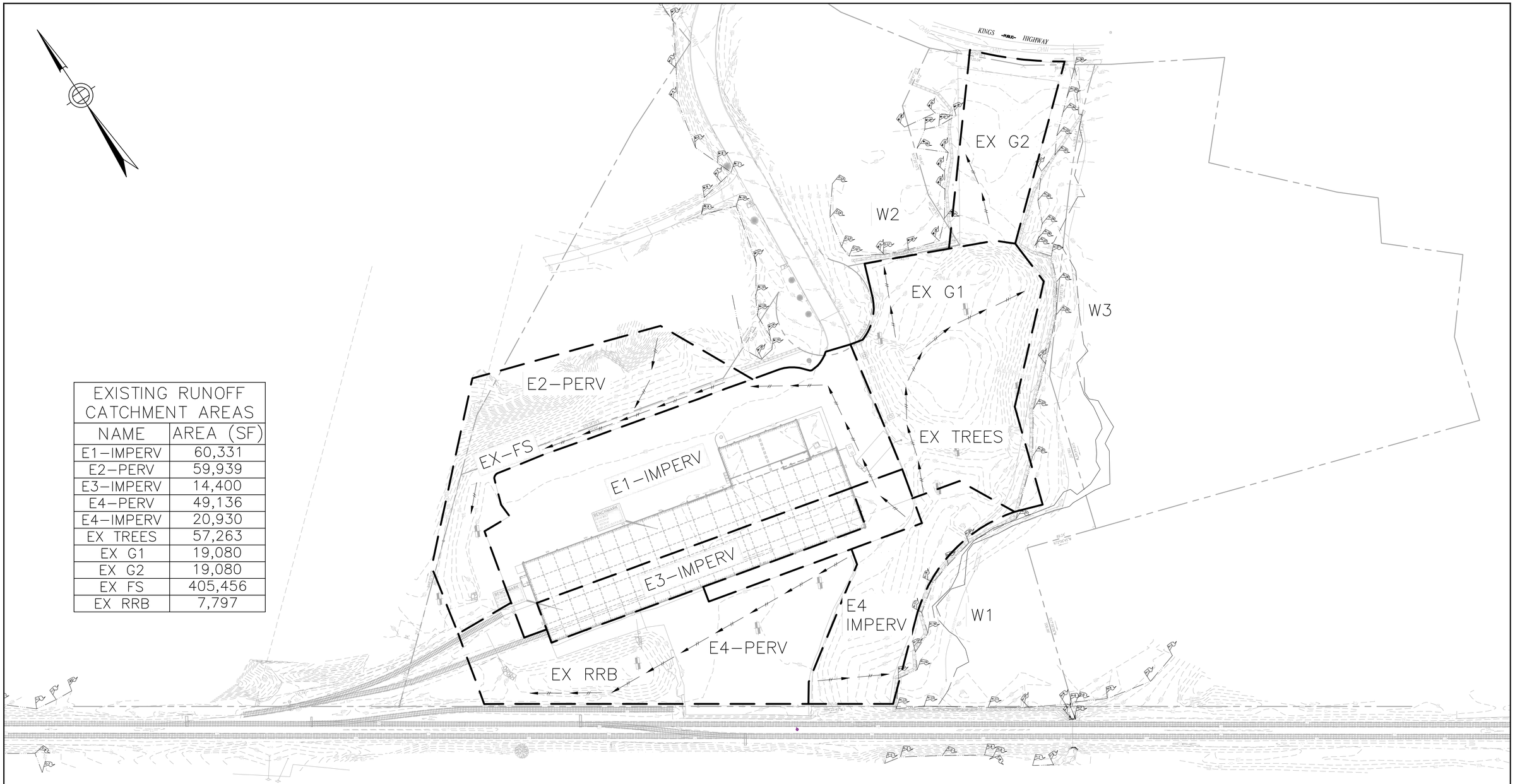
MBTA has an NPDES Stormwater Management Plan for MBTA Owned and Operated Facilities. The Summary of Compliance with Maintenance lists the maintenance schedule.

Standard 10: Illicit Discharge
All illicit discharges to the stormwater management system are prohibited

There are <u>no existing</u>; and there will be <u>no new</u> illicit stormwater discharges into the groundwater nor directly discharged into the nearby riverway that are visible nor intended to be installed with the proposed station improvements.

Appendix A:
Existing/Proposed Conditions Plans

Figure 1: Existing Conditions Plan



EXISTING RUNOFF CATCHMENT AREAS	
NAME	AREA (SF)
E1–IMPERV	60,331
E2–PERV	59,939
E3–IMPERV	14,400
E4–PERV	49,136
E4–IMPERV	20,930
EX TREES	57,263
EX G1	19,080
EX G2	19,080
EX FS	405,456
EX RRB	7,797

SCALE IN FEET
60 0 60 120

NOTICE OF INTENT SUBMISSION

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

DATE: 8/24/21

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

EXISTING CONDITIONS WATERSHET PLAN
FIGURE 1

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

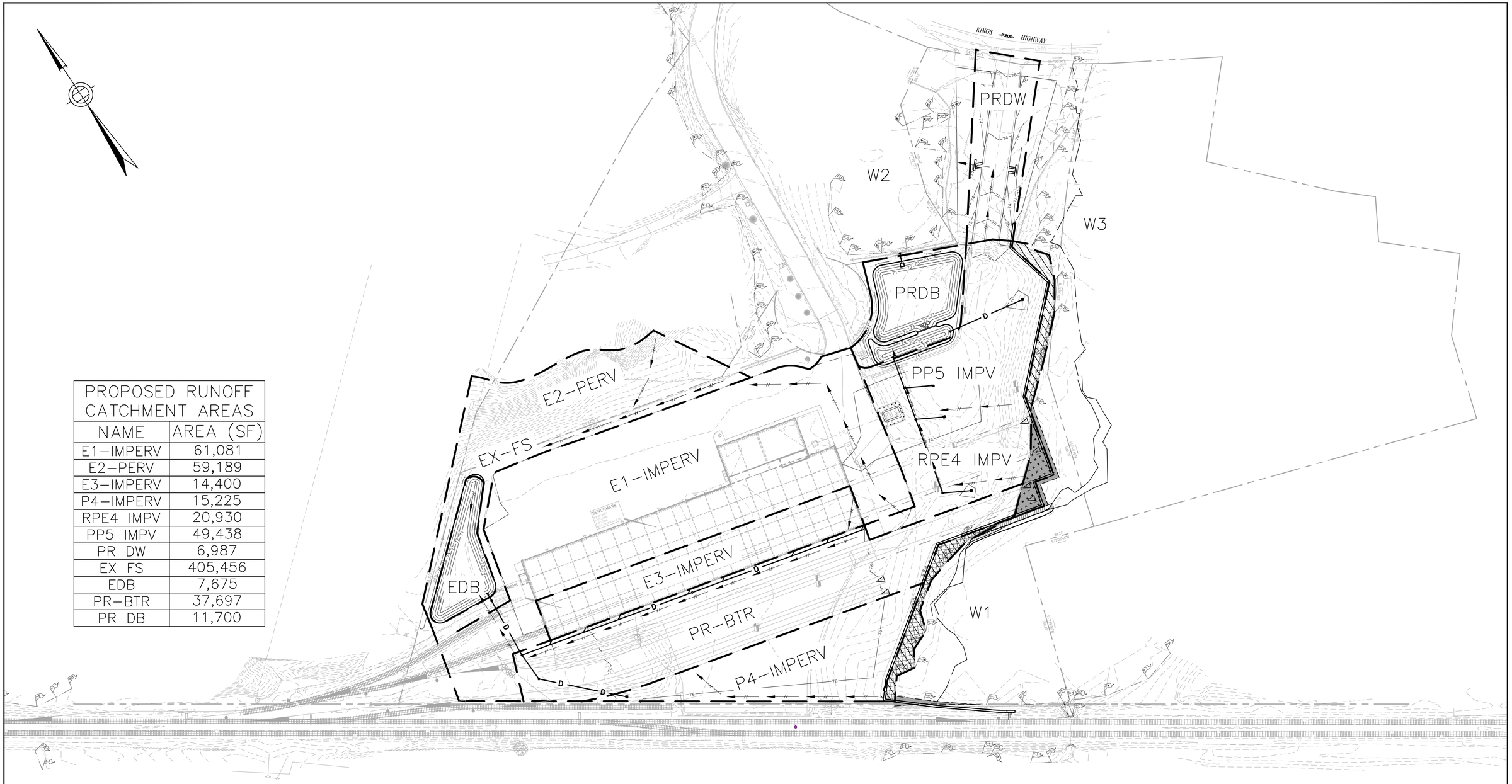
PROJECT MANAGER DATE

SCALE: XXX	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	XXX	XXX	XXX	SHEET **X-X**	

FILE NAME: \\BOSFIL11\NAL_Pro\MBTA\2021\E2X89804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tank Improvements\700 CADD\704 – CIVIL\30% NOI\NOI Graphics\ C–EXWATERSHED.dwg
PLOT DATE: Aug 24, 2021 – 12:01pm

Figure 2: Proposed Conditions Plan

PROPOSED RUNOFF CATCHMENT AREAS	
NAME	AREA (SF)
E1–IMPERV	61,081
E2–PERV	59,189
E3–IMPERV	14,400
P4–IMPERV	15,225
RPE4 IMPV	20,930
PP5 IMPV	49,438
PR DW	6,987
EX FS	405,456
EDB	7,675
PR–BTR	37,697
PR DB	11,700



SCALE IN FEET

60 0 60 120

NOTICE OF INTENT SUBMISSION

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

PROPOSED CONDITIONS WATERSHET PLAN FIGURE 2

massDOT
Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

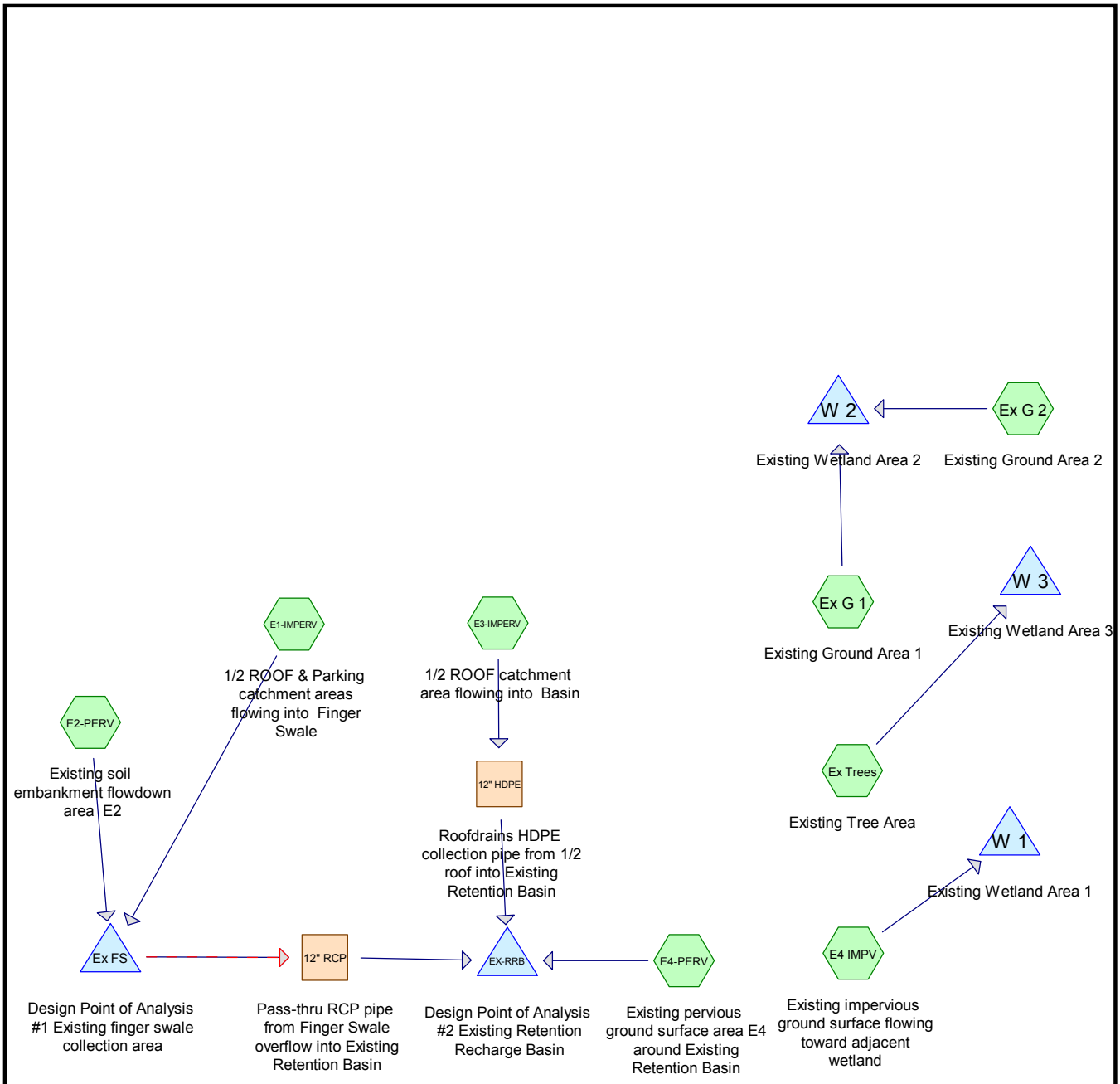
PROJECT MANAGER DATE

SCALE: XXX	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	XXX	XXX	XXX	SHEET **X-X**	

FILE NAME: P:\MBTA\2021\E2X69804 – MBTA Rochester Maintenance Facility\TASK 02 – Yard Tark Improvements\700 CADD\704 – CIVIL\30% NOI\NOI Graphics\ C–PROPWATERSHED.dwg
PLOT DATE: Sep 15, 2021 – 1:57pm

Appendix B:
Hydrologic Analyses

EXISTING CONDITIONS


W 2
Ex G 2
Existing Wetland Area 2
Existing Ground Area 2
W 3
Ex G 1
Existing Wetland Area 3
Existing Ground Area 1
E1-IMPERV
E3-IMPERV
1/2 ROOF & Parking catchment areas flowing into Finger Swale
1/2 ROOF catchment area flowing into Basin
E2-PERV
Existing soil embankment flowdown area E2
12" HDPE
Ex Trees
Existing Tree Area
Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin
W 1
Existing Wetland Area 1
Ex FS
12" RCP
EX-RRB
E4-PERV
E4 IMPV
Design Point of Analysis #1 Existing finger swale collection area
Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin
Design Point of Analysis #2 Existing Retention Recharge Basin
Existing pervious ground surface area E4 around Existing Retention Basin
Existing impervious ground surface flowing toward adjacent wetland

Subcat Reach Pond Link

Routing Diagram for Rochester Site - Existing Conditions September 2021

Prepared by Jacobs Engineering, Printed 9/2/2021

HydroCAD® 10.00-17 s/n 00751 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.376	69	50-75% Grass cover, Fair, HSG B (E2-PERV)
1.128	79	<50% Grass cover, Poor, HSG B (E4-PERV)
1.716	98	Roofs, HSG A (E1-IMPERV, E3-IMPERV)
0.480	98	Unconnected pavement, HSG C (E4 IMPV)
1.315	60	Woods, Fair, HSG B (Ex Trees)
0.876	65	Woods/grass comb., Fair, HSG B (Ex G 1, Ex G 2)
6.891	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.716	HSG A	E1-IMPERV, E3-IMPERV
4.695	HSG B	E2-PERV, E4-PERV, Ex G 1, Ex G 2, Ex Trees
0.480	HSG C	E4 IMPV
0.000	HSG D	
0.000	Other	
6.891		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.376	0.000	0.000	0.000	1.376	50-75% Grass cover, Fair	E2-PERV
0.000	1.128	0.000	0.000	0.000	1.128	<50% Grass cover, Poor	E4-PERV
1.716	0.000	0.000	0.000	0.000	1.716	Roofs	E1-IMPERV, E3-IMPERV
0.000	0.000	0.480	0.000	0.000	0.480	Unconnected pavement	E4 IMPV
0.000	1.315	0.000	0.000	0.000	1.315	Woods, Fair	Ex Trees
0.000	0.876	0.000	0.000	0.000	0.876	Woods/grass comb., Fair	Ex G 1, Ex G 2
1.716	**4.695**	**0.480**	**0.000**	**0.000**	**6.891**	**TOTAL AREA**	

Pipe Listing (all nodes)

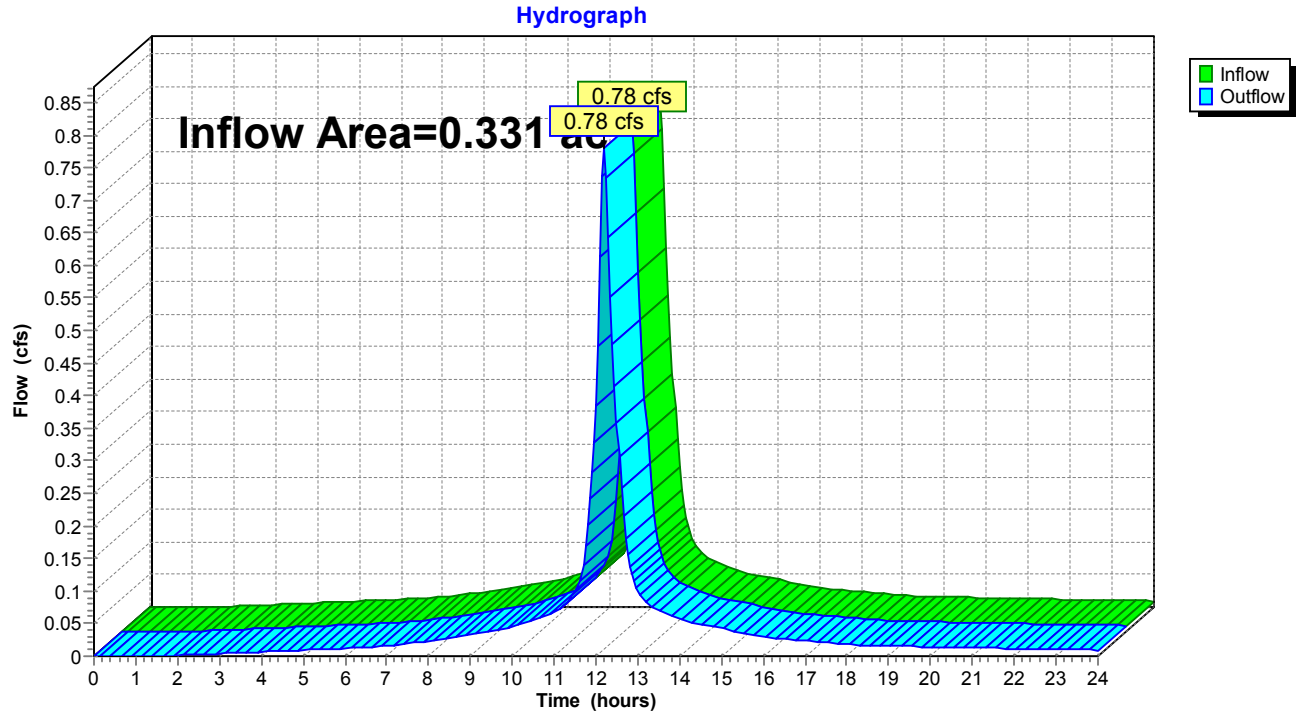
Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	Ex FS	72.68	72.49	65.0	0.0029	0.011	12.0	0.0	0.0

Summary for Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af
Outflow = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

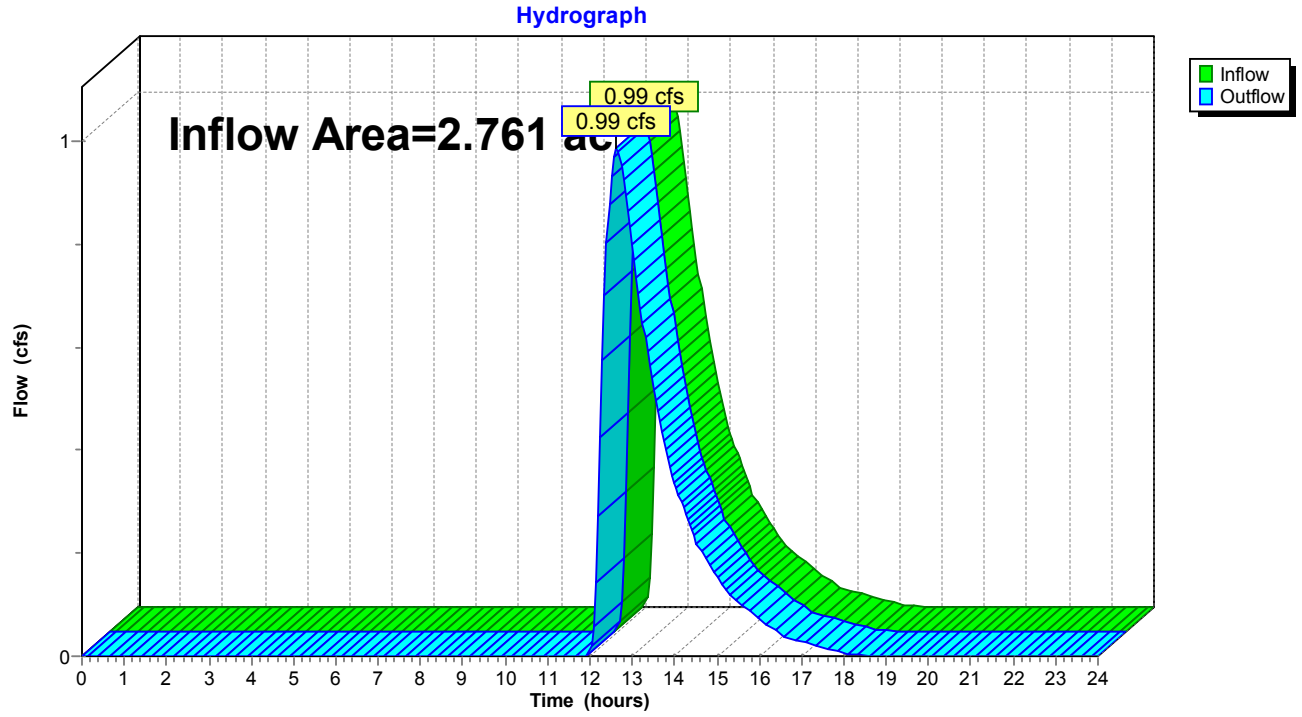


Summary for Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth = 0.58" for 2 year storm event
Inflow = 0.99 cfs @ 12.63 hrs, Volume= 0.134 af
Outflow = 0.99 cfs @ 12.63 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

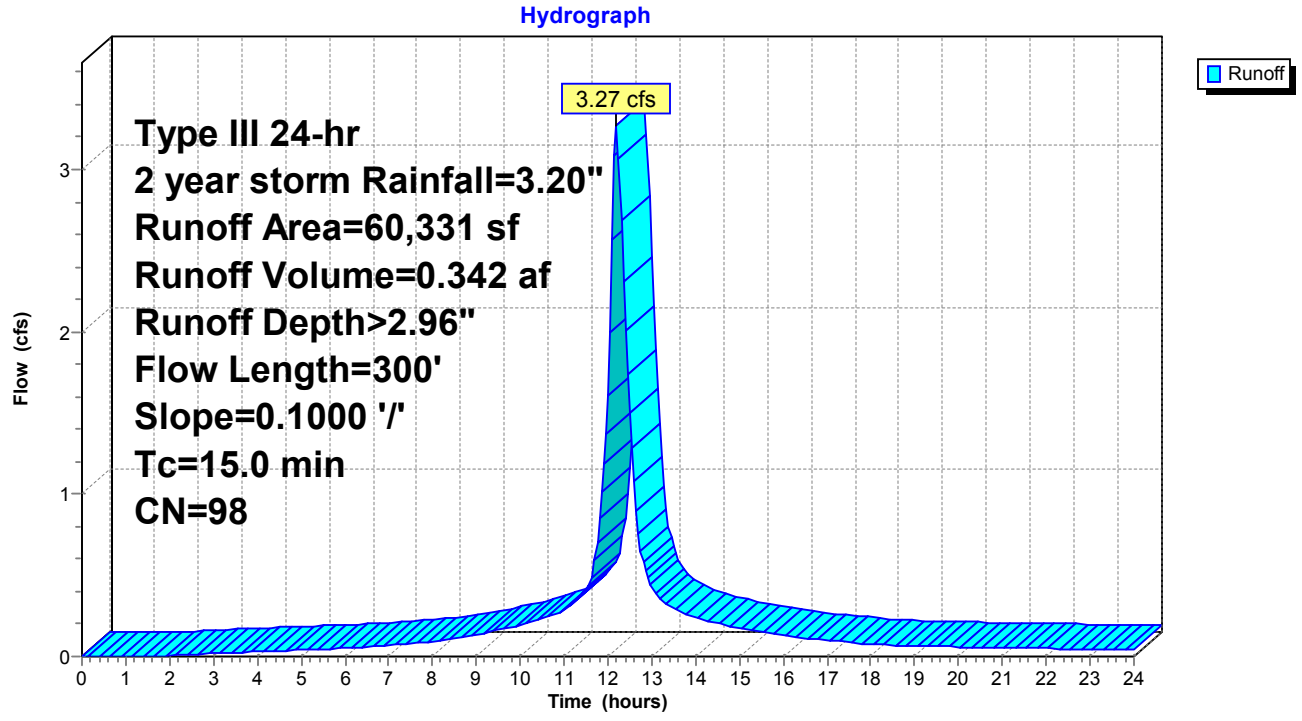
Runoff = 3.27 cfs @ 12.20 hrs, Volume= 0.342 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
60,331	98	Roofs, HSG A
60,331		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

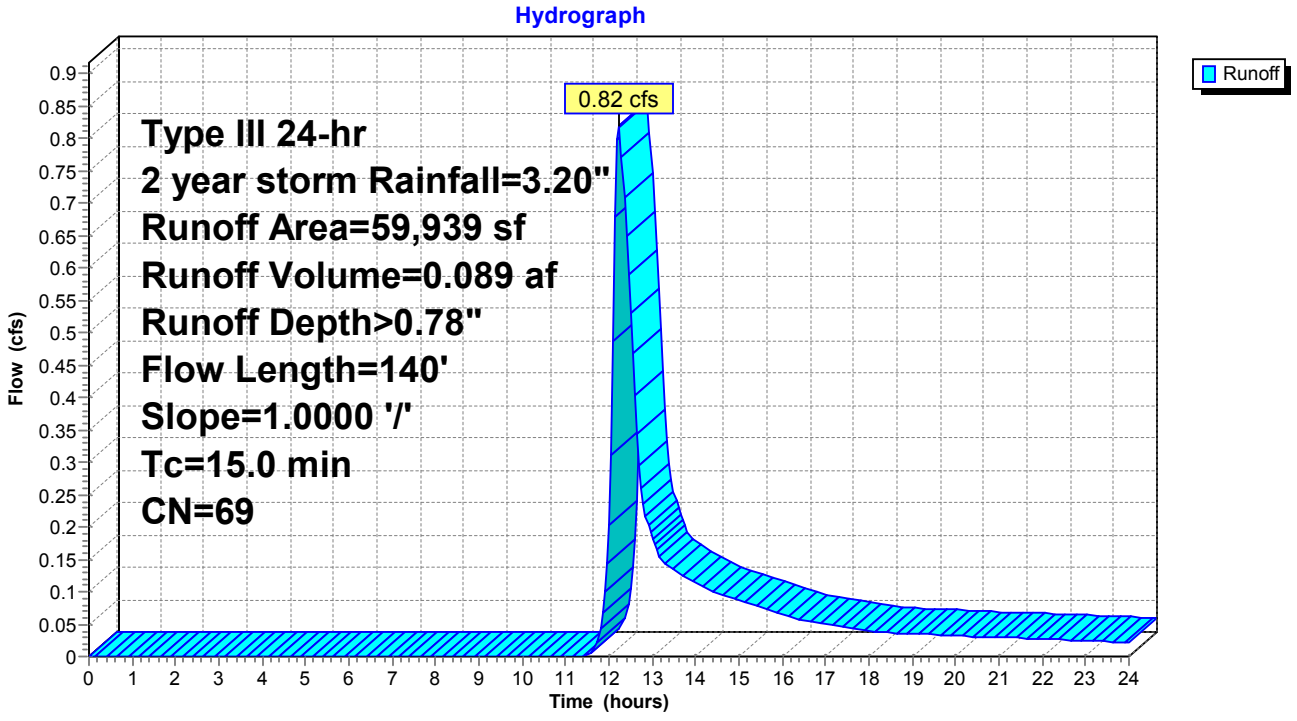
Runoff = 0.82 cfs @ 12.24 hrs, Volume= 0.089 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
59,939	69	50-75% Grass cover, Fair, HSG B
59,939		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

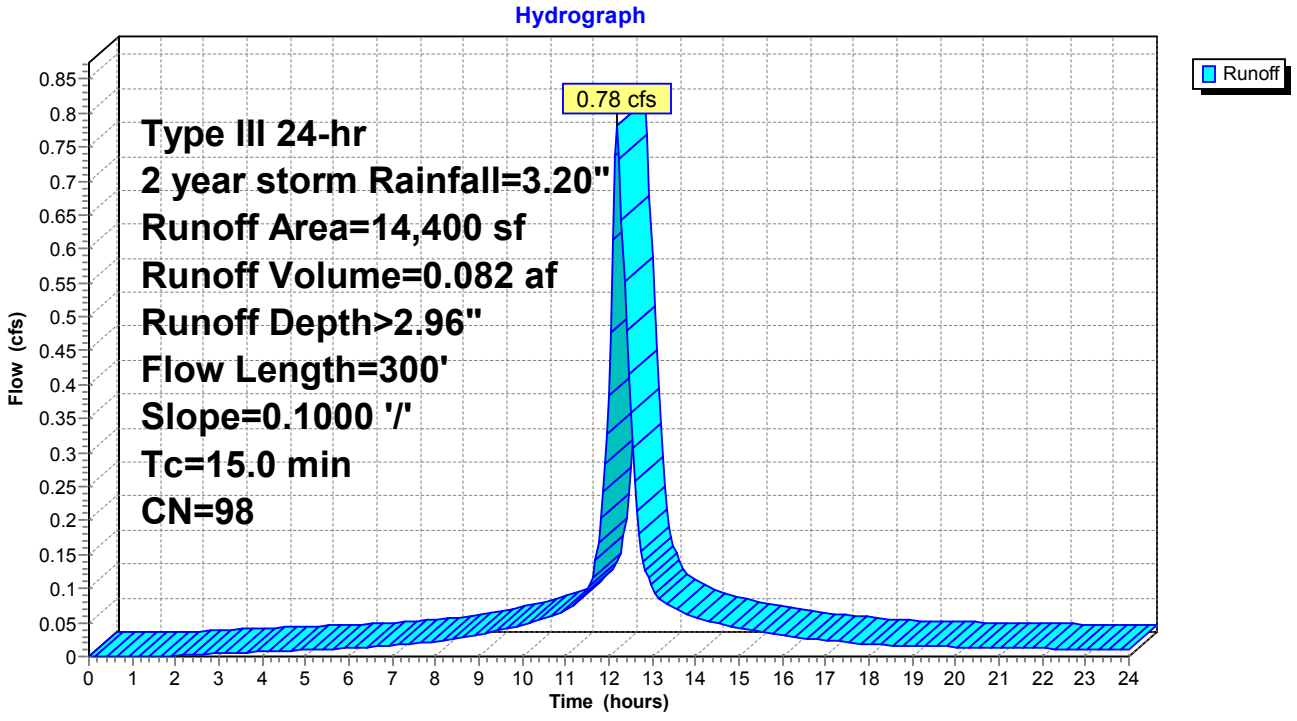
Runoff = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin


Hydrograph
Runoff
0.78 cfs
Type III 24-hr
2 year storm Rainfall=3.20"
Runoff Area=14,400 sf
Runoff Volume=0.082 af
Runoff Depth>2.96"
Flow Length=300'
Slope=0.1000 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland

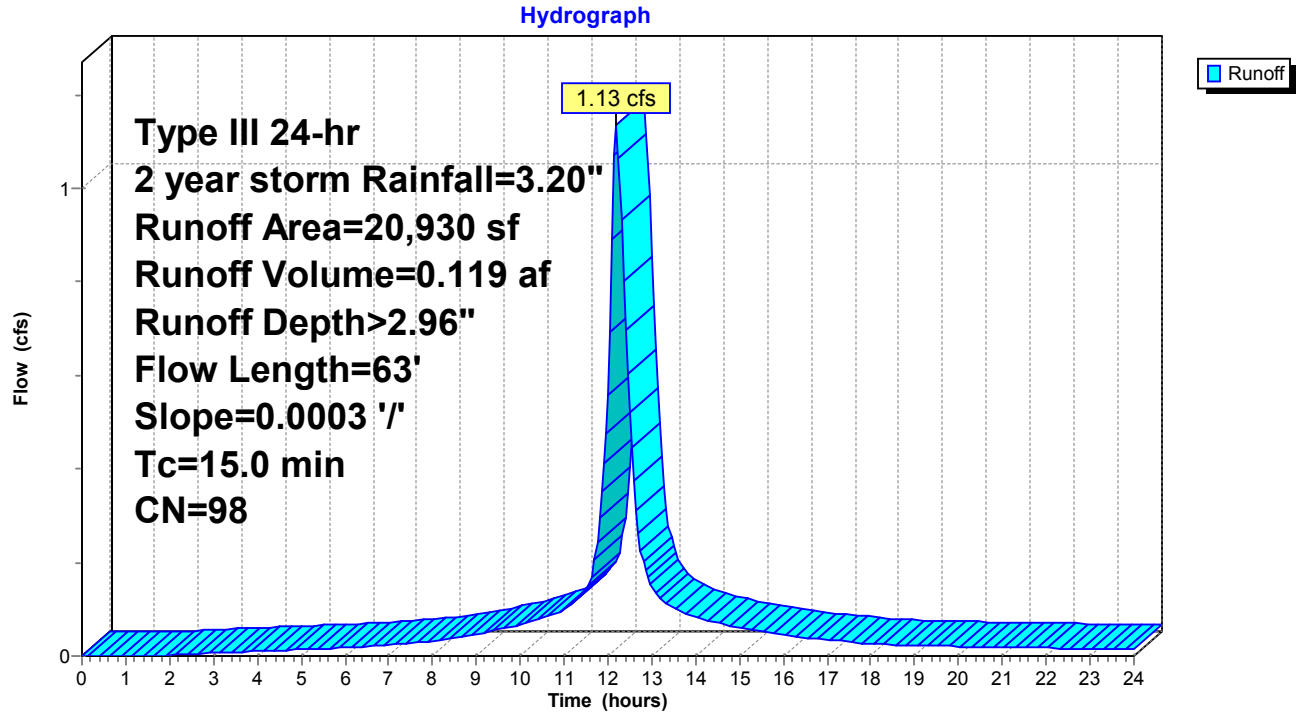
Runoff = 1.13 cfs @ 12.20 hrs, Volume= 0.119 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland



ummary for Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Bas

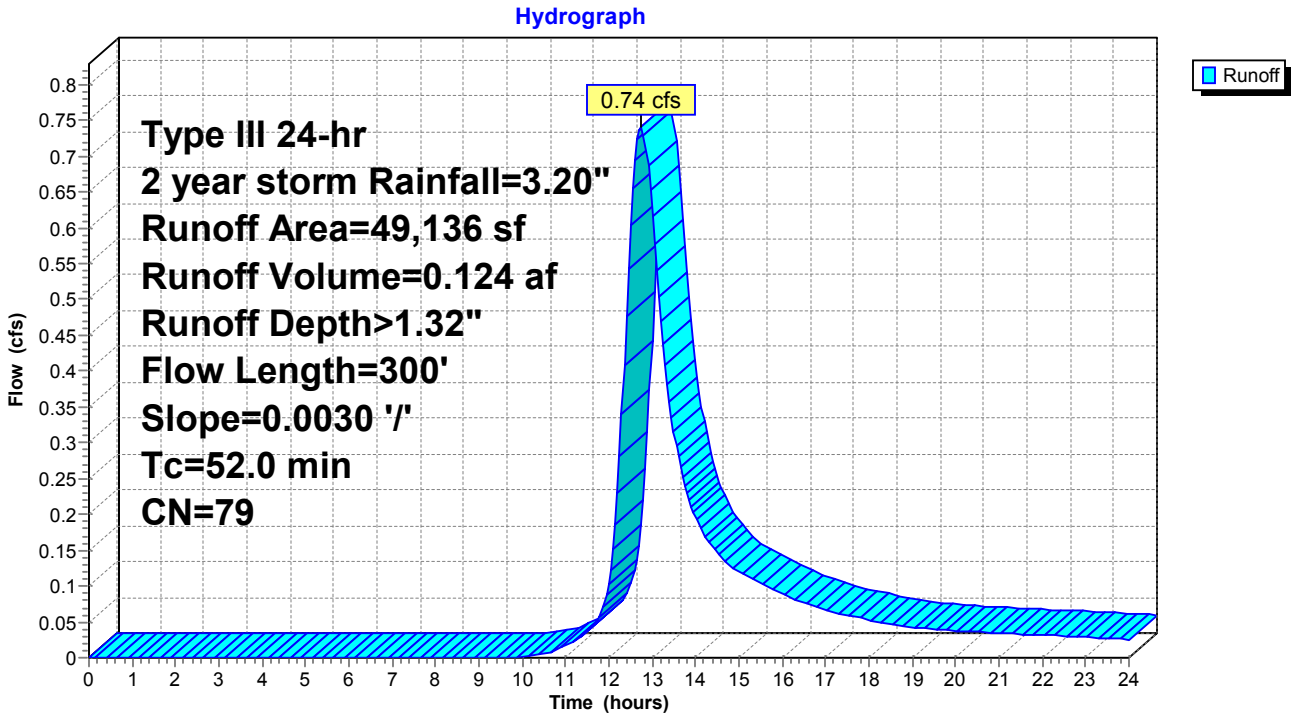
Runoff = 0.74 cfs @ 12.74 hrs, Volume= 0.124 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
49,136	79	<50% Grass cover, Poor, HSG B
49,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.0	300	0.0030	0.10		**Sheet Flow, overland runoff toward basin** Grass: Short n= 0.150 P2= 3.00"

Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Basin



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 1.87" for 2 year storm event
Inflow = 4.07 cfs @ 12.21 hrs, Volume= 0.431 af
Outflow = 1.35 cfs @ 12.63 hrs, Volume= 0.378 af, Atten= 67%, Lag= 25.2 min
Discarded = 0.37 cfs @ 12.63 hrs, Volume= 0.244 af
Secondary = 0.99 cfs @ 12.63 hrs, Volume= 0.134 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.31' @ 12.63 hrs Surf.Area= 0.185 ac Storage= 0.183 af

Plug-Flow detention time= 175.0 min calculated for 0.377 af (88% of inflow)
Center-of-Mass det. time= 117.6 min (906.2 - 788.6)

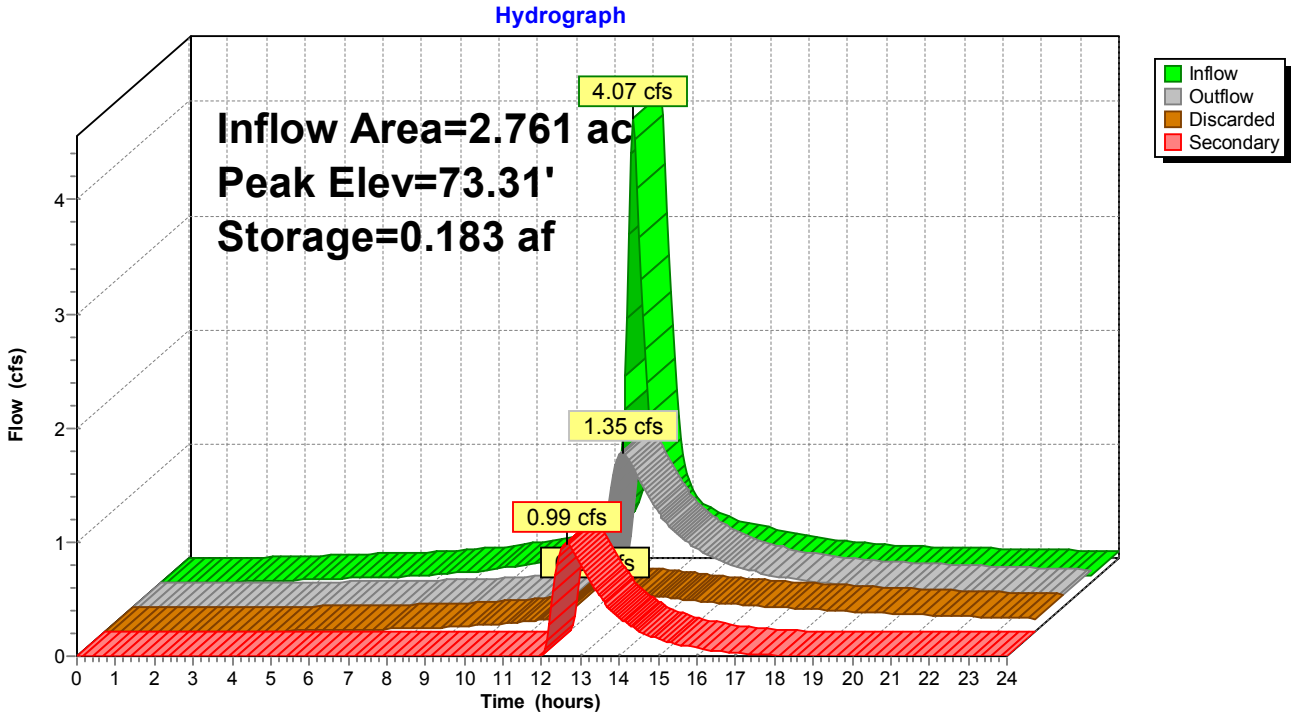
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Discarded	72.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 61.00' Phase-In= 1.00'

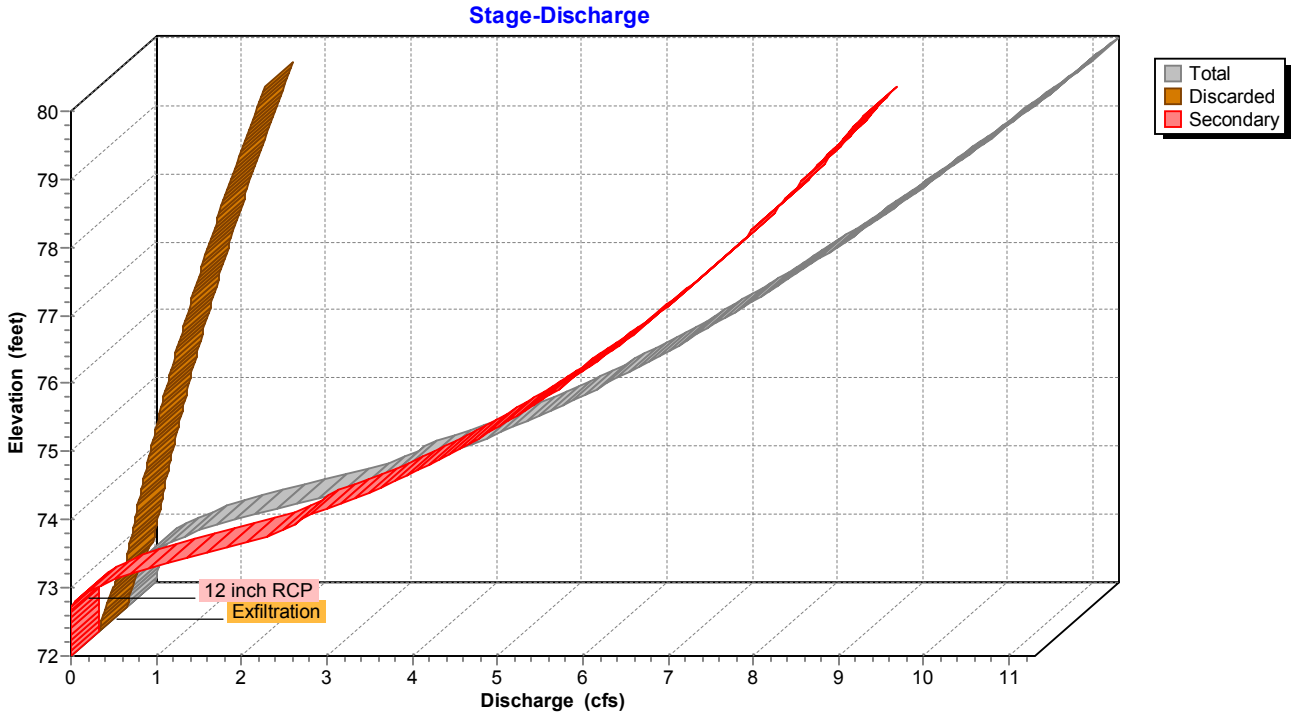
Discarded OutFlow Max=0.37 cfs @ 12.63 hrs HW=73.31' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.37 cfs)

Secondary OutFlow Max=0.98 cfs @ 12.63 hrs HW=73.31' (Free Discharge)
↑—**1=12 inch RCP** (Barrel Controls 0.98 cfs @ 2.71 fps)

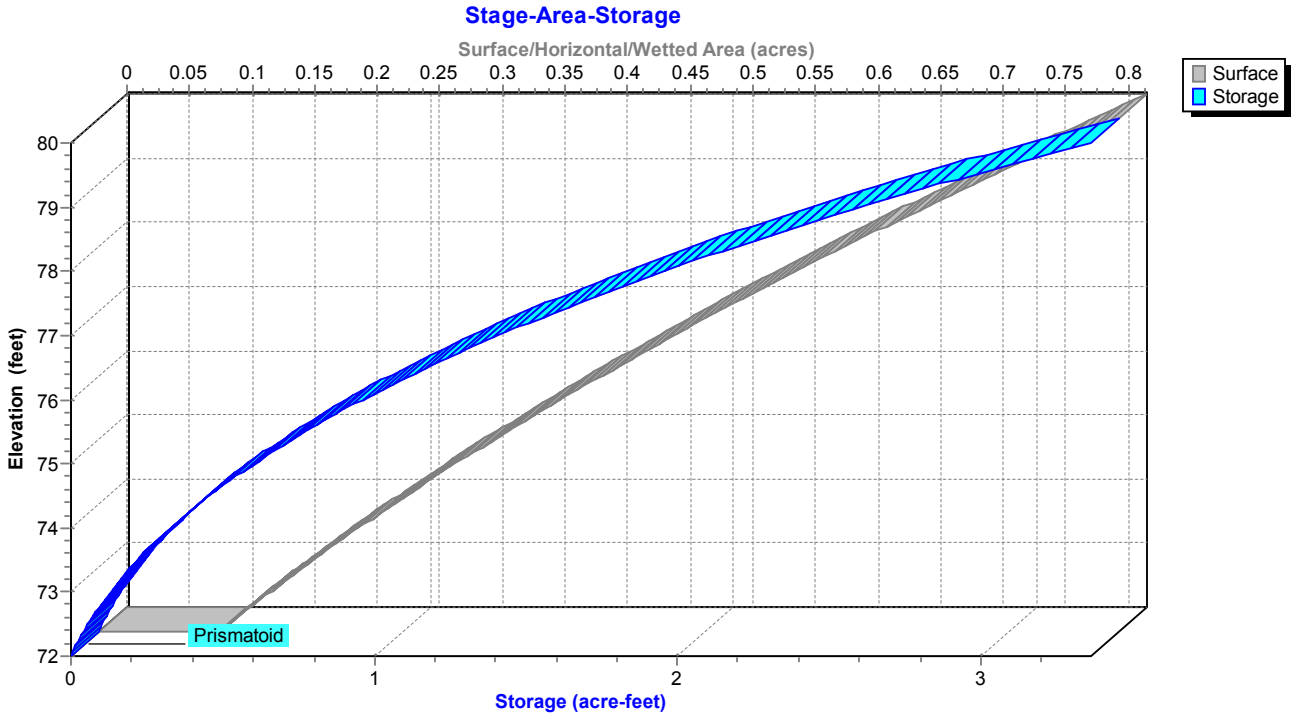
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Summary for Subcatchment Ex G 1: Existing Ground Area 1

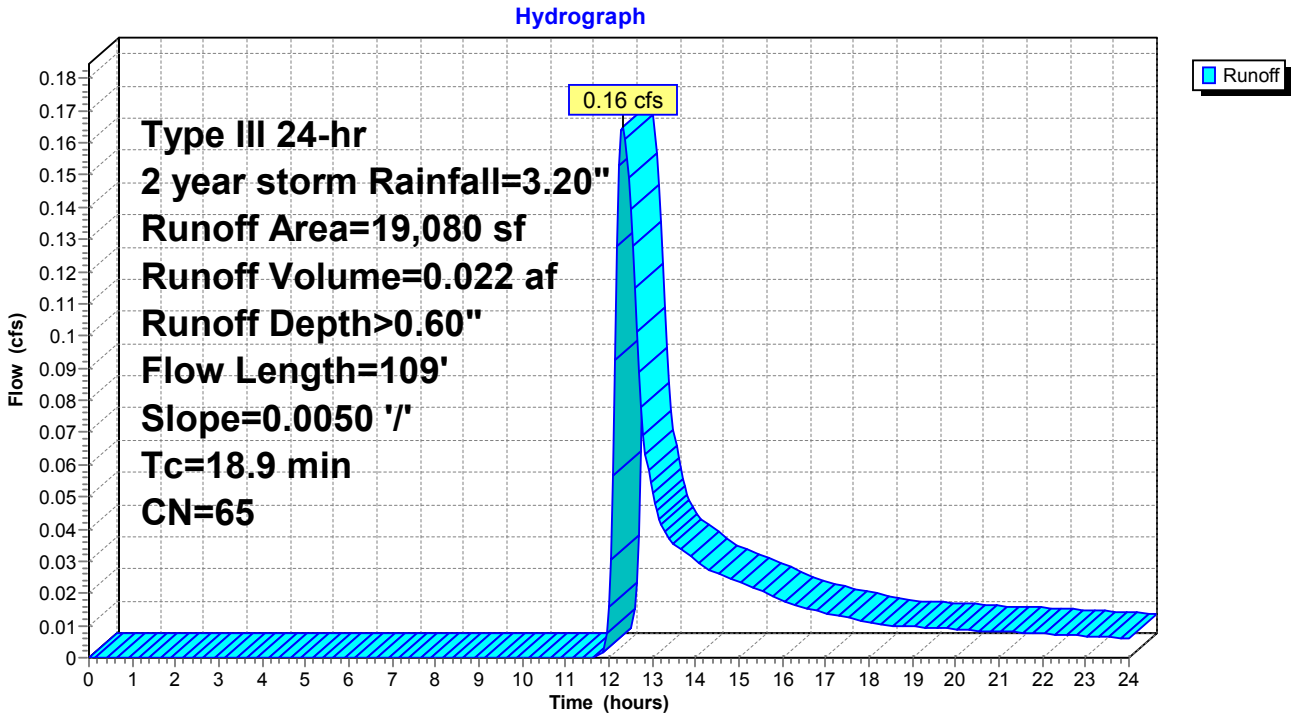
Runoff = 0.16 cfs @ 12.33 hrs, Volume= 0.022 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 1: Existing Ground Area 1



Summary for Subcatchment Ex G 2: Existing Ground Area 2

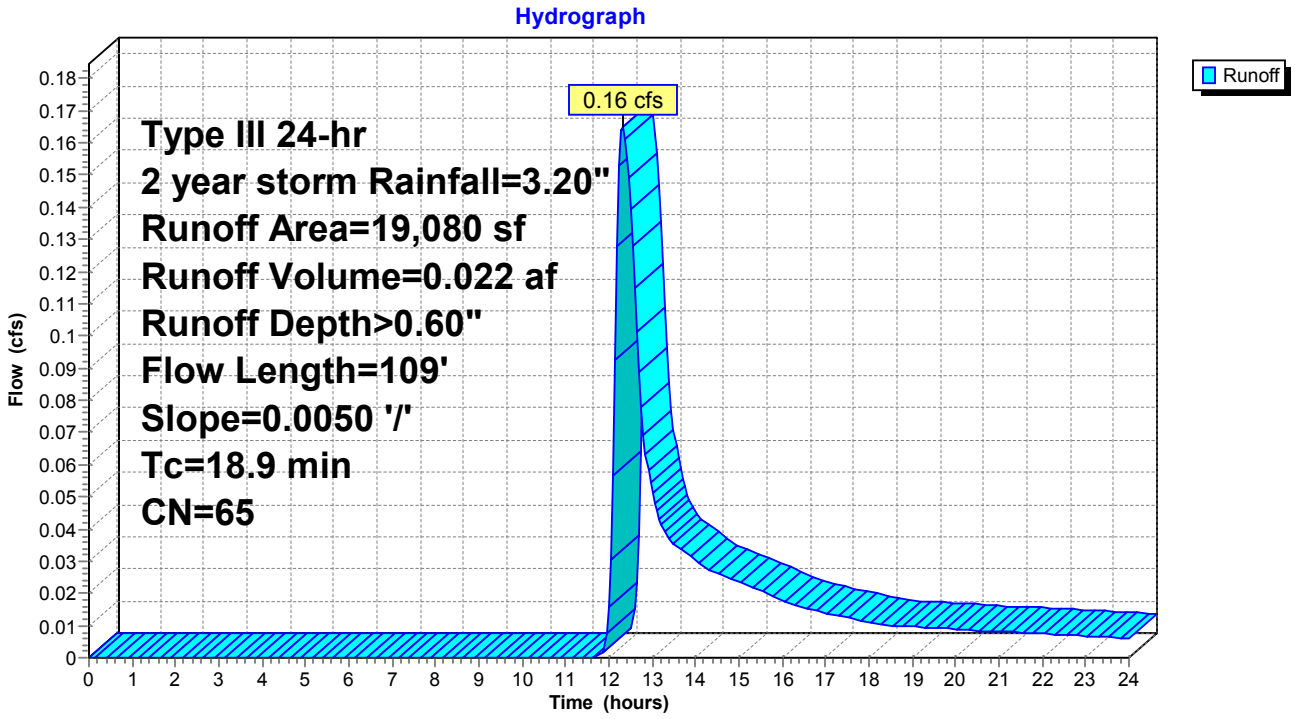
Runoff = 0.16 cfs @ 12.33 hrs, Volume= 0.022 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 2: Existing Ground Area 2



Summary for Subcatchment Ex Trees: Existing Tree Area

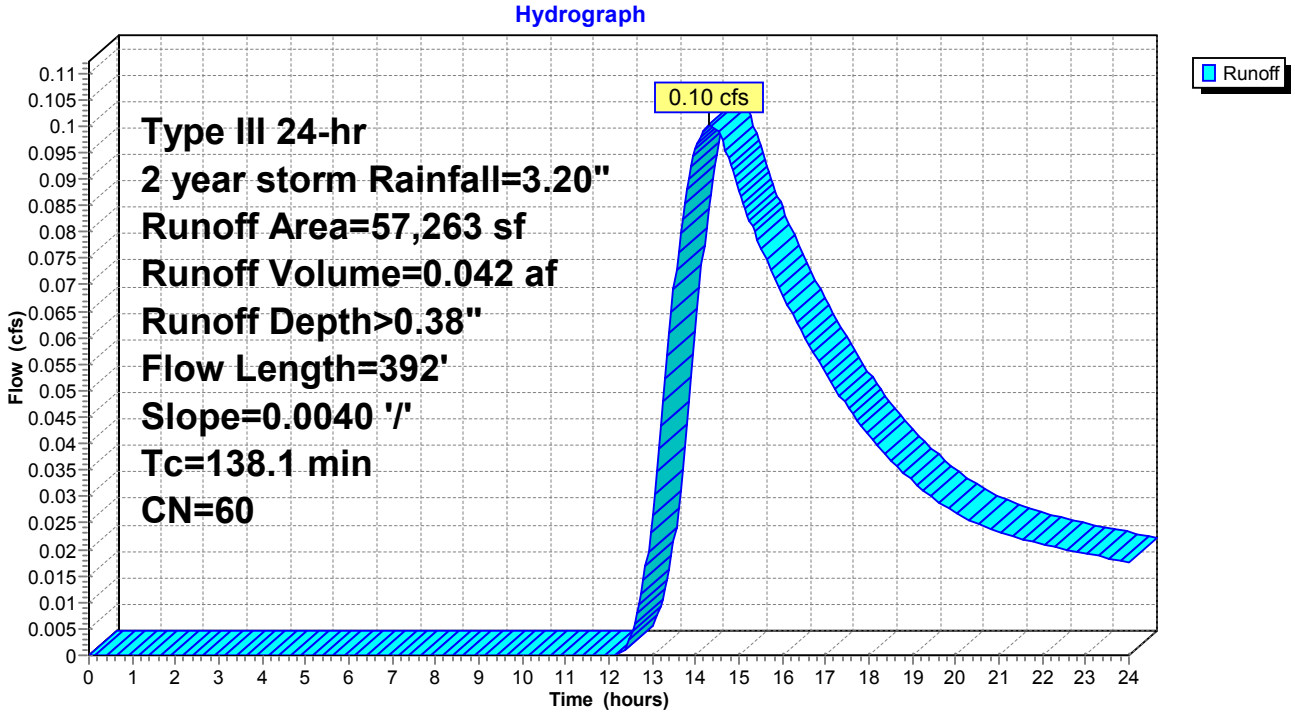
Runoff = 0.10 cfs @ 14.32 hrs, Volume= 0.042 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
57,263	60	Woods, Fair, HSG B
57,263		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
128.0	200	0.0040	0.03		**Sheet Flow, Natural Tree Area** Woods: Dense underbrush n= 0.800 P2= 3.00"
10.1	192	0.0040	0.32		**Shallow Concentrated Flow, Natural Tree Area** Woodland Kv= 5.0 fps
138.1	392	Total			

Subcatchment Ex Trees: Existing Tree Area



Summary for Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

Inflow Area = 4.220 ac, 40.66% Impervious, Inflow Depth > 0.97" for 2 year storm event
Inflow = 1.94 cfs @ 12.59 hrs, Volume= 0.340 af
Outflow = 1.93 cfs @ 12.64 hrs, Volume= 0.339 af, Atten= 1%, Lag= 3.0 min
Discarded = 1.93 cfs @ 12.64 hrs, Volume= 0.339 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.24' @ 12.64 hrs Surf.Area= 0.032 ac Storage= 0.007 af

Plug-Flow detention time= 2.6 min calculated for 0.339 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (827.2 - 824.8)

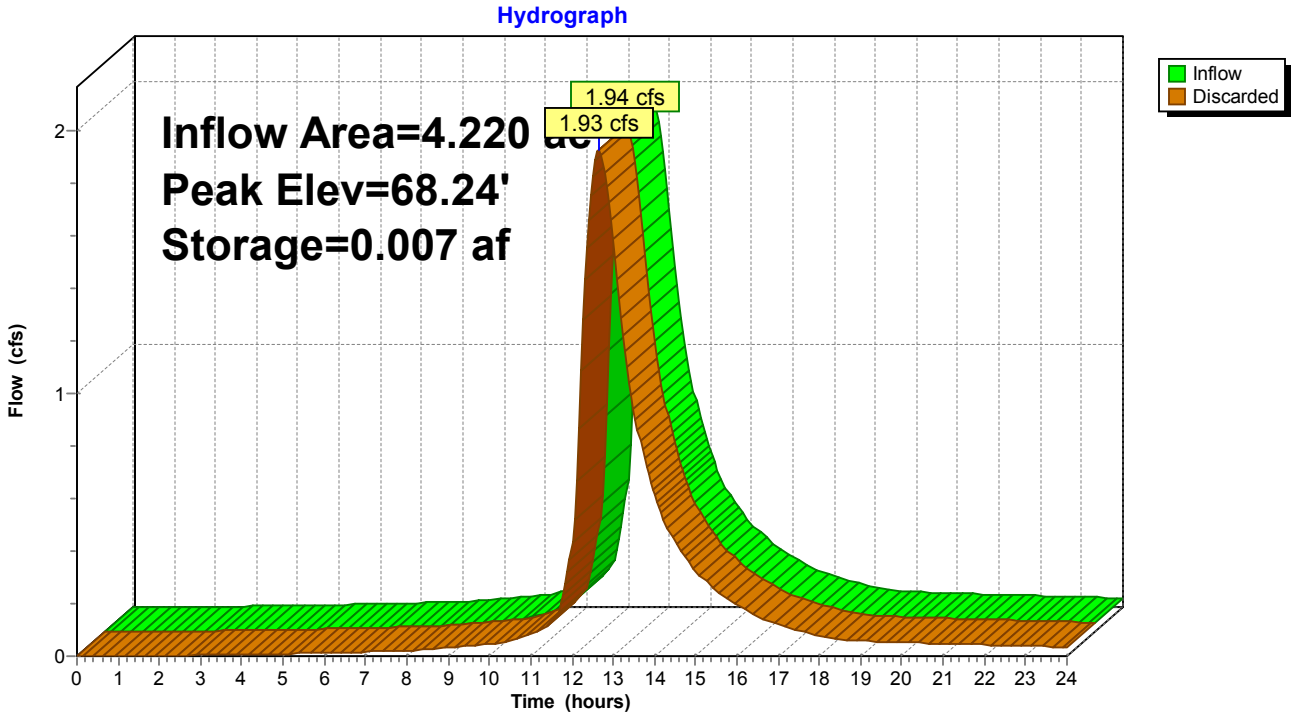
Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	0.569 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
68.00	0.028	0.000	0.000
69.00	0.043	0.036	0.036
70.00	0.063	0.053	0.089
71.00	0.091	0.077	0.166
72.00	0.121	0.106	0.272
73.00	0.148	0.134	0.406
74.00	0.179	0.163	0.569

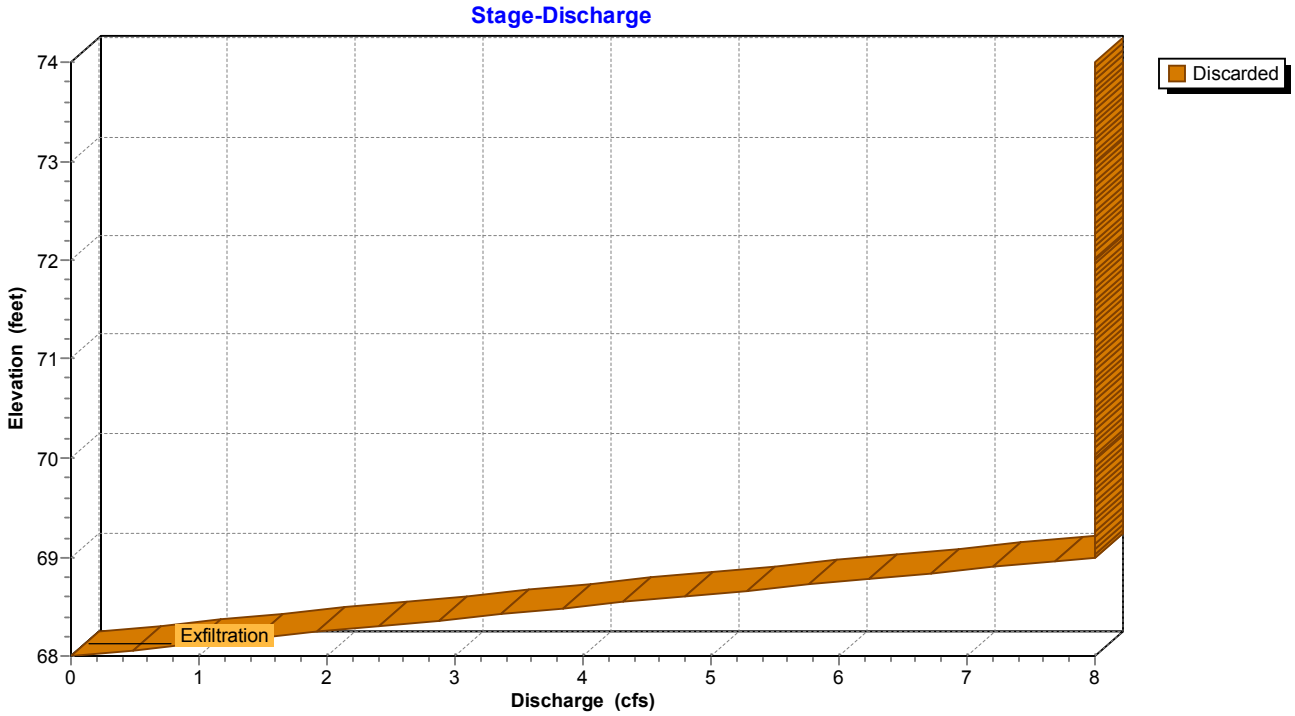
Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.00 cfs Exfiltration at all elevations** Phase-In= 1.00'

Discarded OutFlow Max=1.93 cfs @ 12.64 hrs HW=68.24' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.93 cfs)

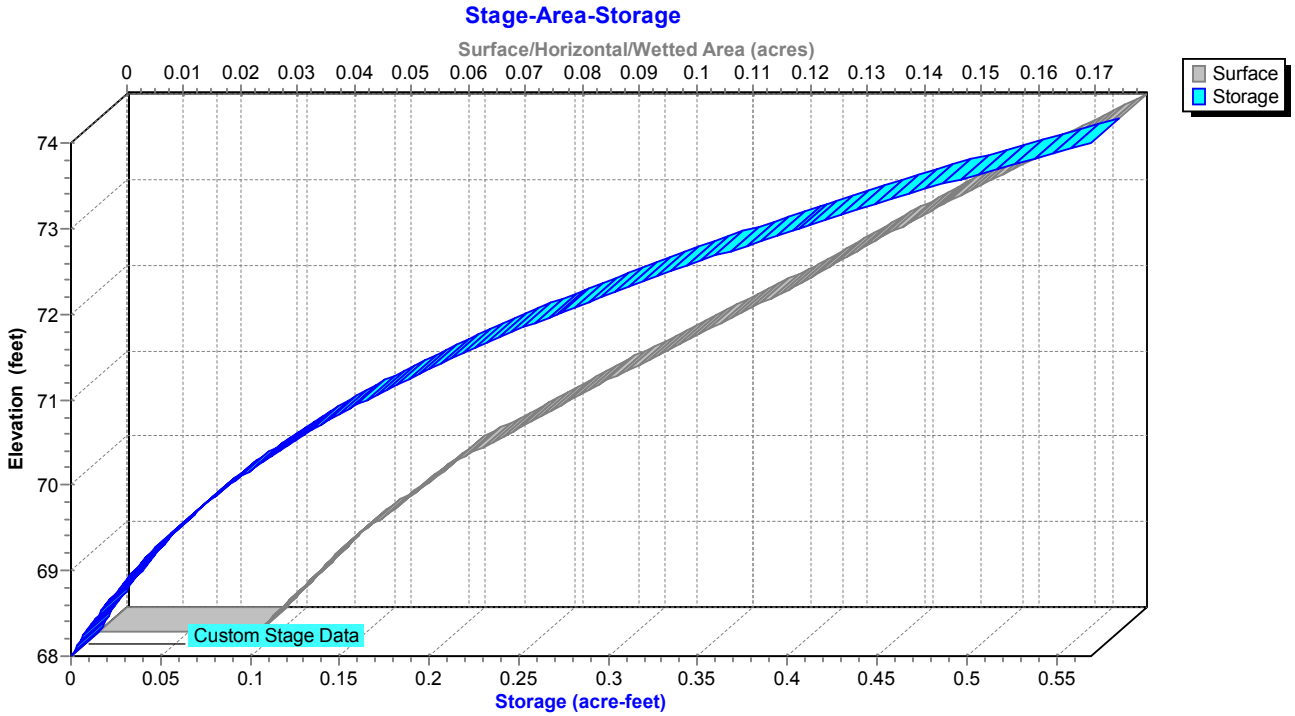
Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

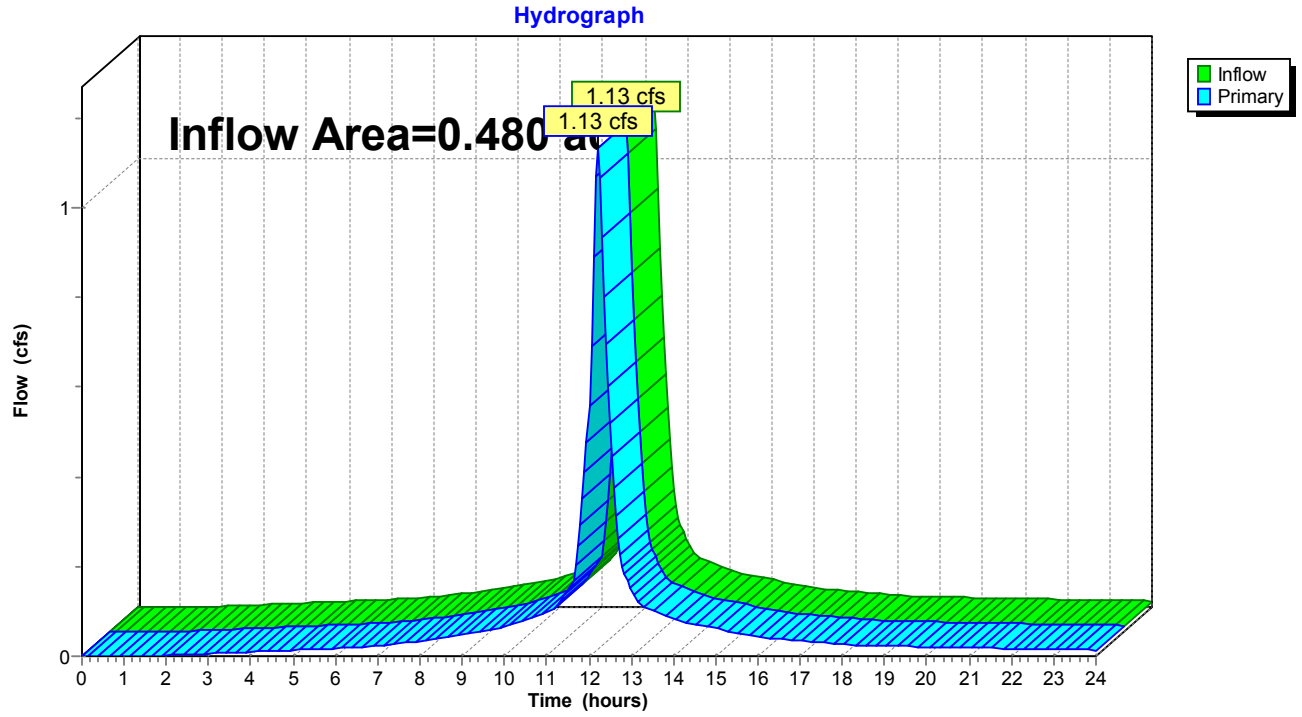


Summary for Pond W 1: Existing Wetland Area 1

Inflow Area = 0.480 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 1.13 cfs @ 12.20 hrs, Volume= 0.119 af
Primary = 1.13 cfs @ 12.20 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 1: Existing Wetland Area 1

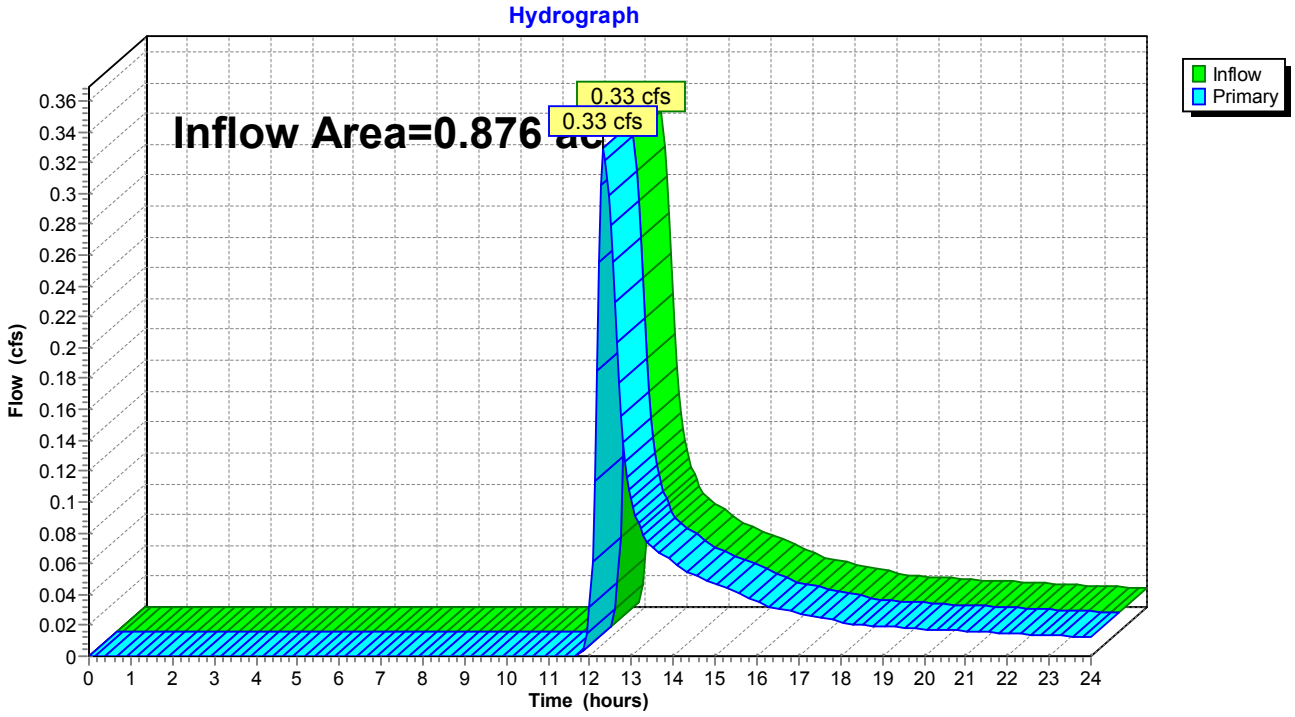


Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.876 ac, 0.00% Impervious, Inflow Depth > 0.60" for 2 year storm event
Inflow = 0.33 cfs @ 12.33 hrs, Volume= 0.044 af
Primary = 0.33 cfs @ 12.33 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2

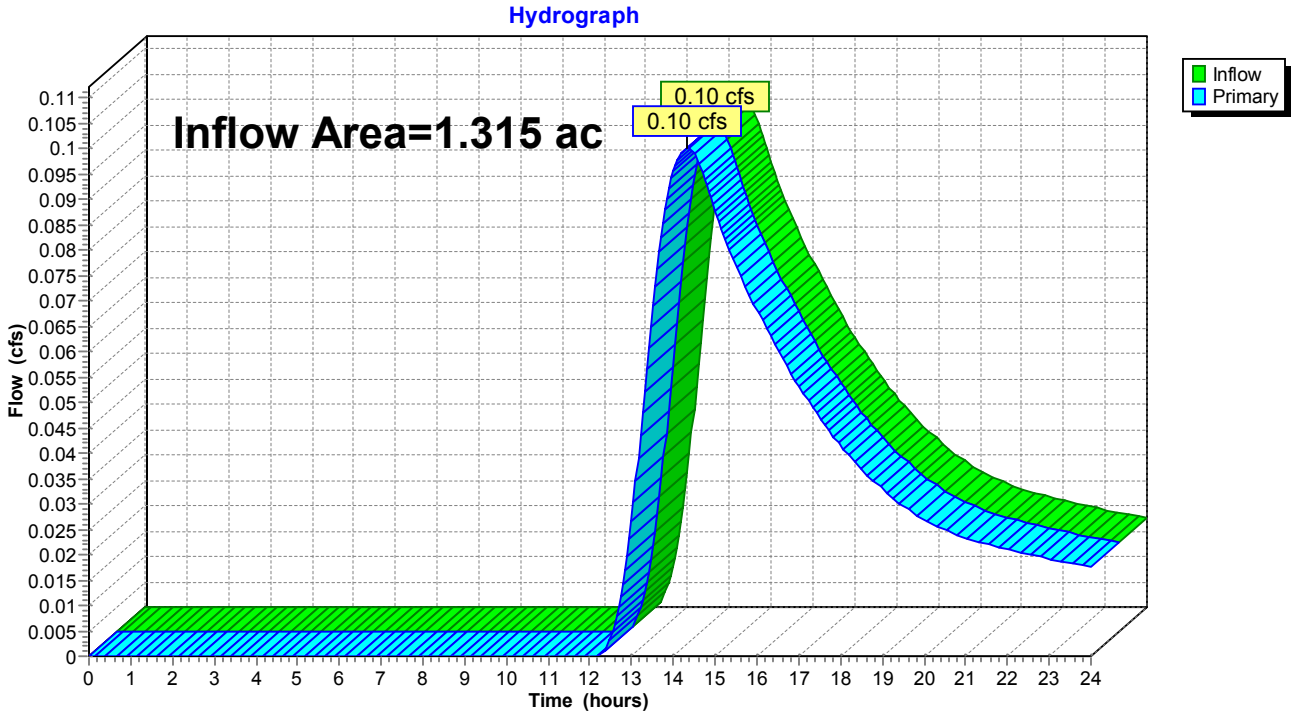


Summary for Pond W 3: Existing Wetland Area 3

Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth > 0.38" for 2 year storm event
Inflow = 0.10 cfs @ 14.32 hrs, Volume= 0.042 af
Primary = 0.10 cfs @ 14.32 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 3: Existing Wetland Area 3

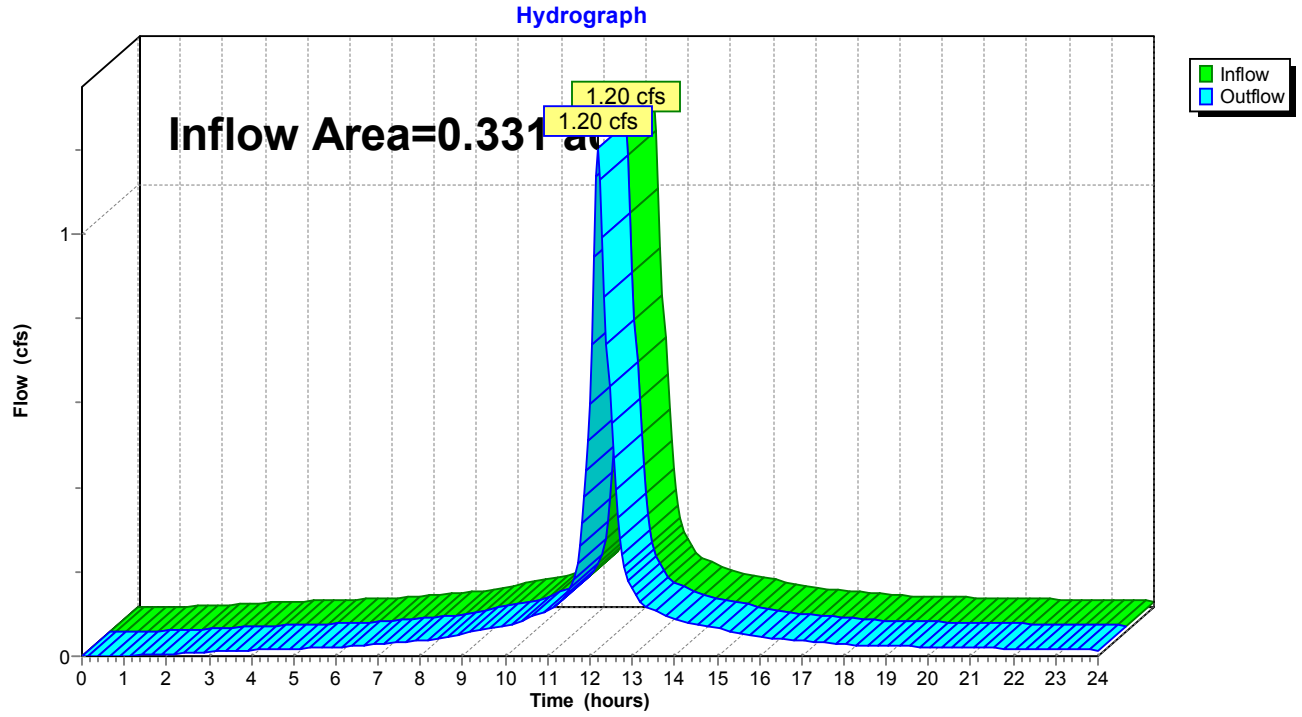


Summary for Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af
Outflow = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

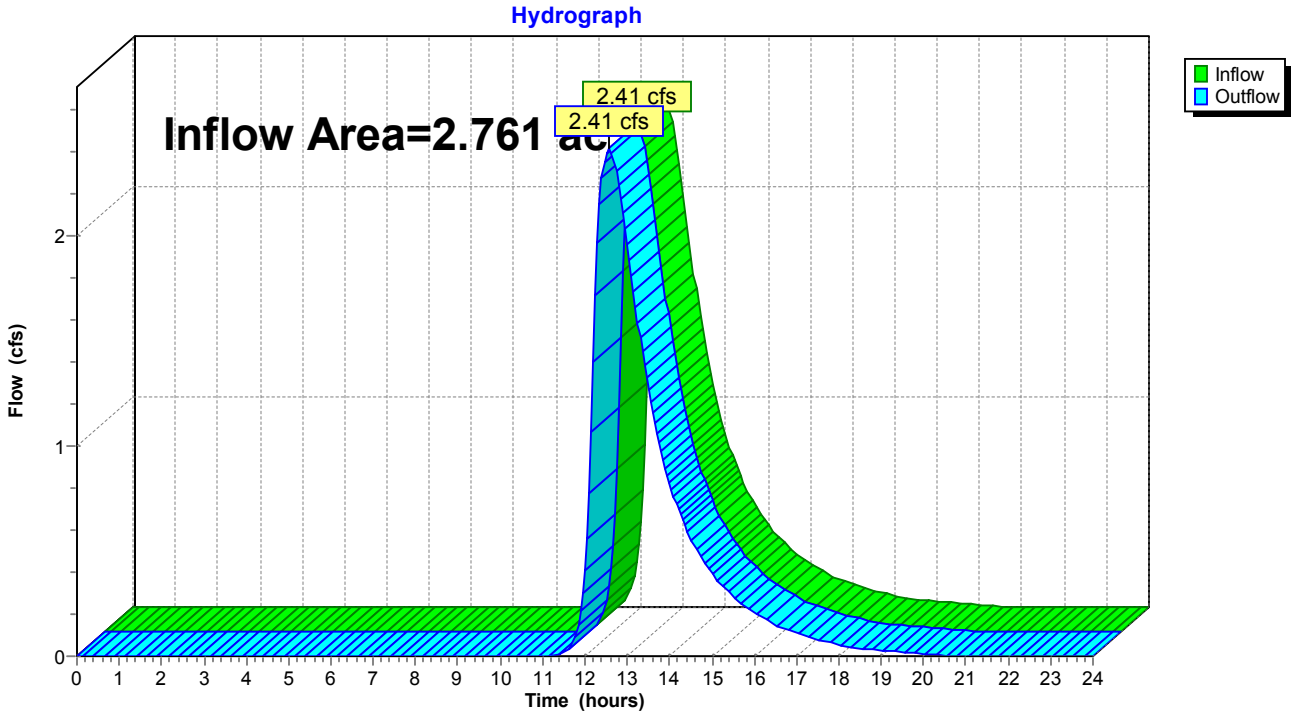


Summary for Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth = 1.59" for 10 year storm event
Inflow = 2.41 cfs @ 12.57 hrs, Volume= 0.367 af
Outflow = 2.41 cfs @ 12.57 hrs, Volume= 0.367 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

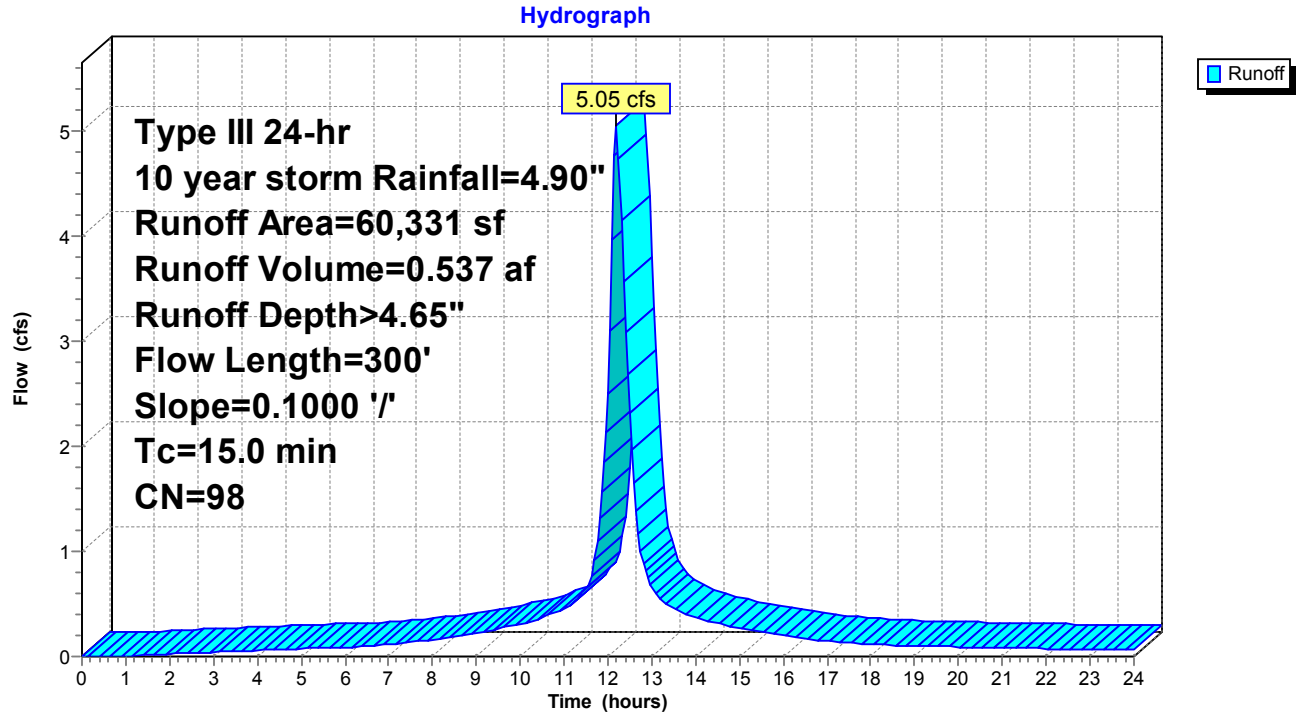
Runoff = 5.05 cfs @ 12.20 hrs, Volume= 0.537 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
60,331	98	Roofs, HSG A
60,331		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

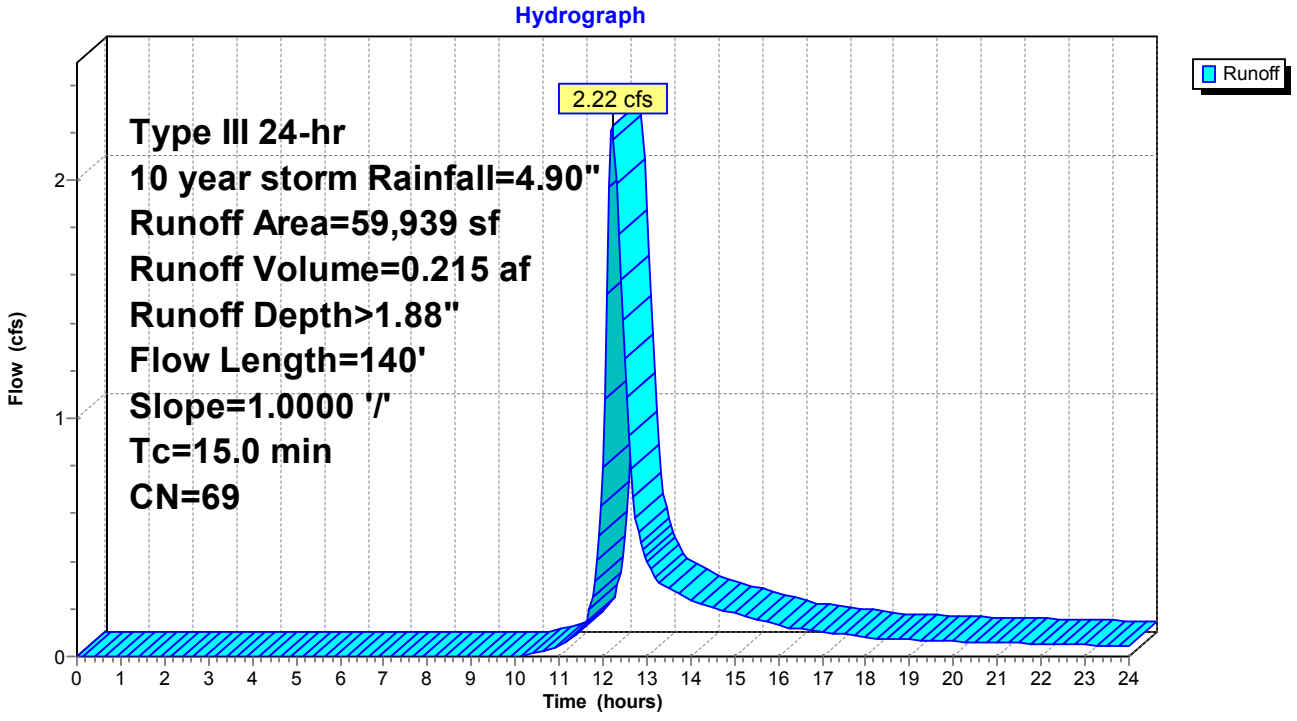
Runoff = 2.22 cfs @ 12.22 hrs, Volume= 0.215 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
59,939	69	50-75% Grass cover, Fair, HSG B
59,939		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

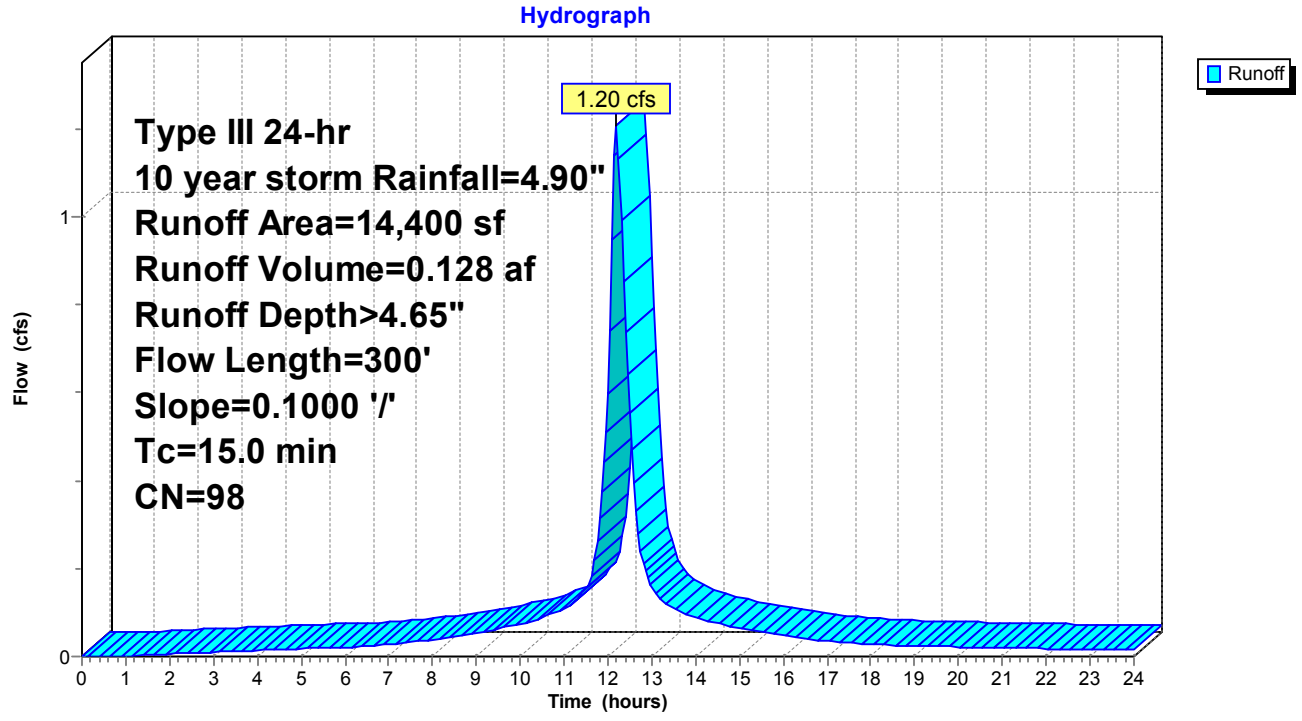
Runoff = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland

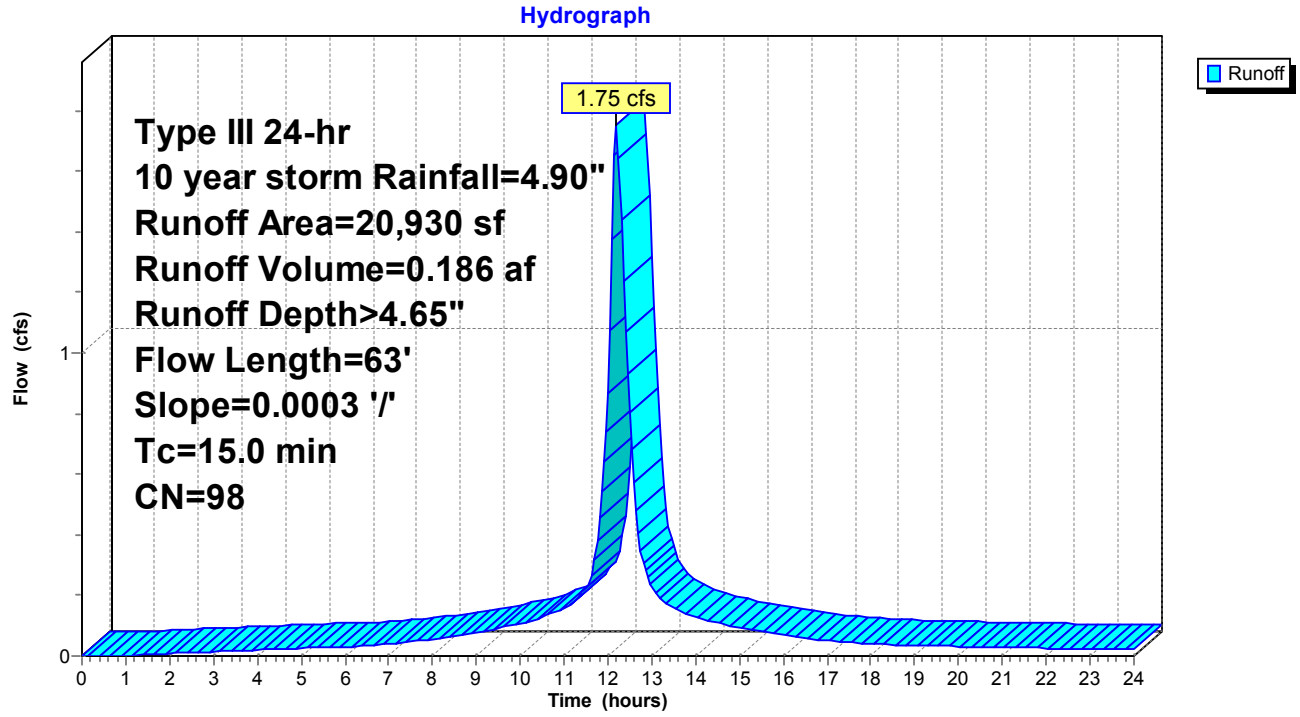
Runoff = 1.75 cfs @ 12.20 hrs, Volume= 0.186 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland



ummary for Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Bas

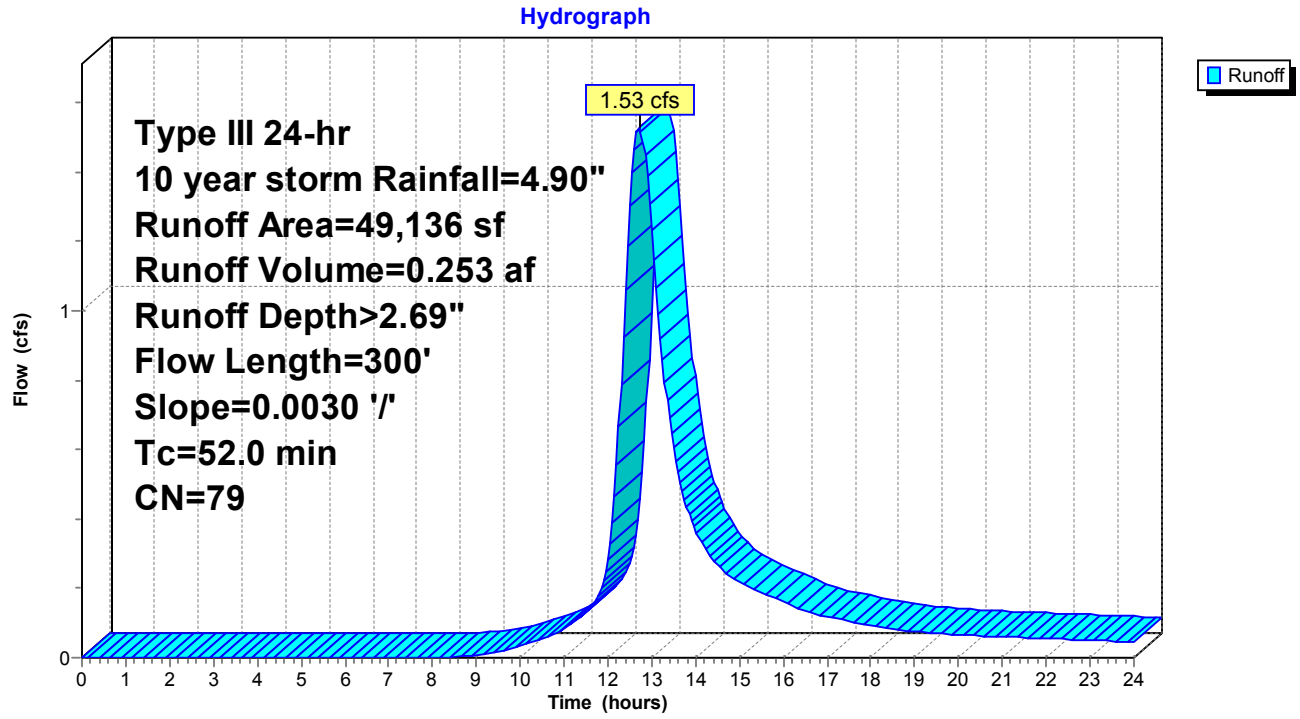
Runoff = 1.53 cfs @ 12.71 hrs, Volume= 0.253 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
49,136	79	<50% Grass cover, Poor, HSG B
49,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.0	300	0.0030	0.10		**Sheet Flow, overland runoff toward basin** Grass: Short n= 0.150 P2= 3.00"

Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Basin



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 3.27" for 10 year storm event
Inflow = 7.26 cfs @ 12.20 hrs, Volume= 0.753 af
Outflow = 2.87 cfs @ 12.57 hrs, Volume= 0.682 af, Atten= 61%, Lag= 22.0 min
Discarded = 0.45 cfs @ 12.57 hrs, Volume= 0.315 af
Secondary = 2.41 cfs @ 12.57 hrs, Volume= 0.367 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.81' @ 12.57 hrs Surf.Area= 0.222 ac Storage= 0.285 af

Plug-Flow detention time= 134.6 min calculated for 0.681 af (90% of inflow)
Center-of-Mass det. time= 87.7 min (872.4 - 784.7)

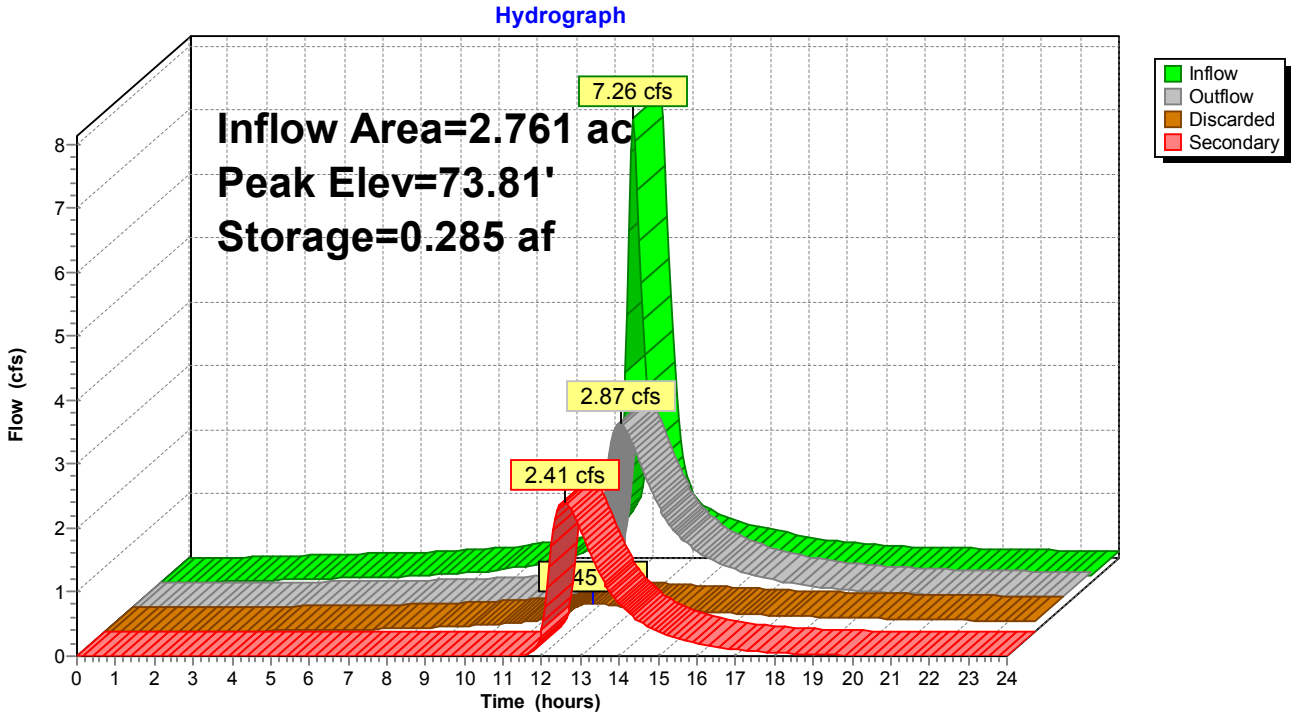
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Discarded	72.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 61.00' Phase-In= 1.00'

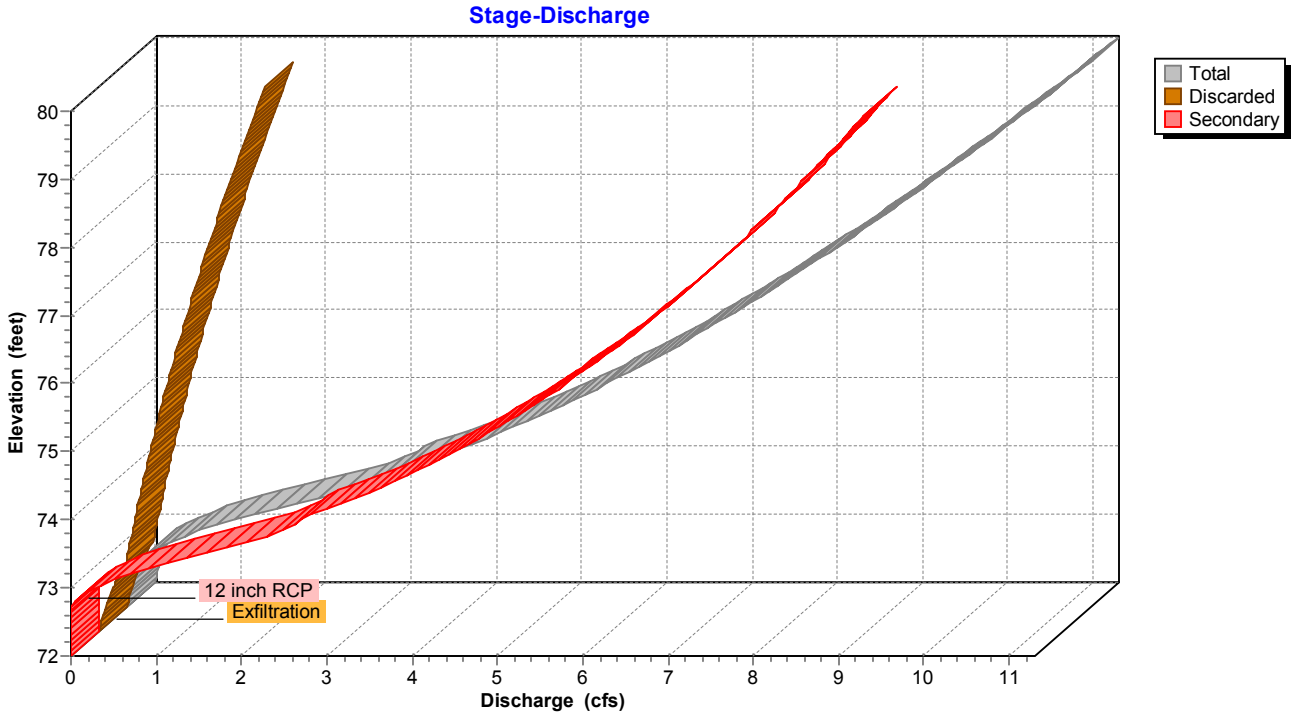
Discarded OutFlow Max=0.45 cfs @ 12.57 hrs HW=73.81' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.45 cfs)

Secondary OutFlow Max=2.42 cfs @ 12.57 hrs HW=73.81' (Free Discharge)
↑—**1=12 inch RCP** (Barrel Controls 2.42 cfs @ 3.40 fps)

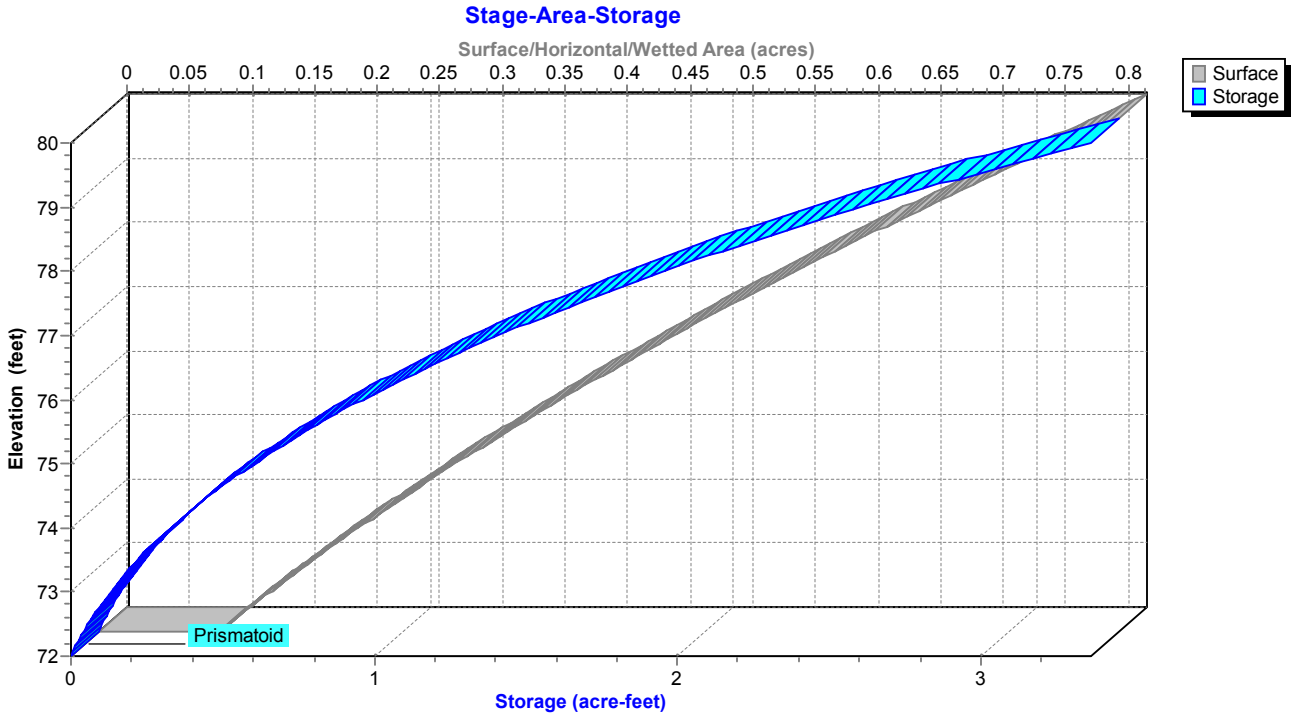
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area


Stage-Area-Storage
Surface/Horizontal/Wetted Area (acres)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8
Surface
Storage
Elevation (feet)
80 79 78 77 76 75 74 73 72
Prismatoid
0 1 2 3
Storage (acre-feet)

Summary for Subcatchment Ex G 1: Existing Ground Area 1

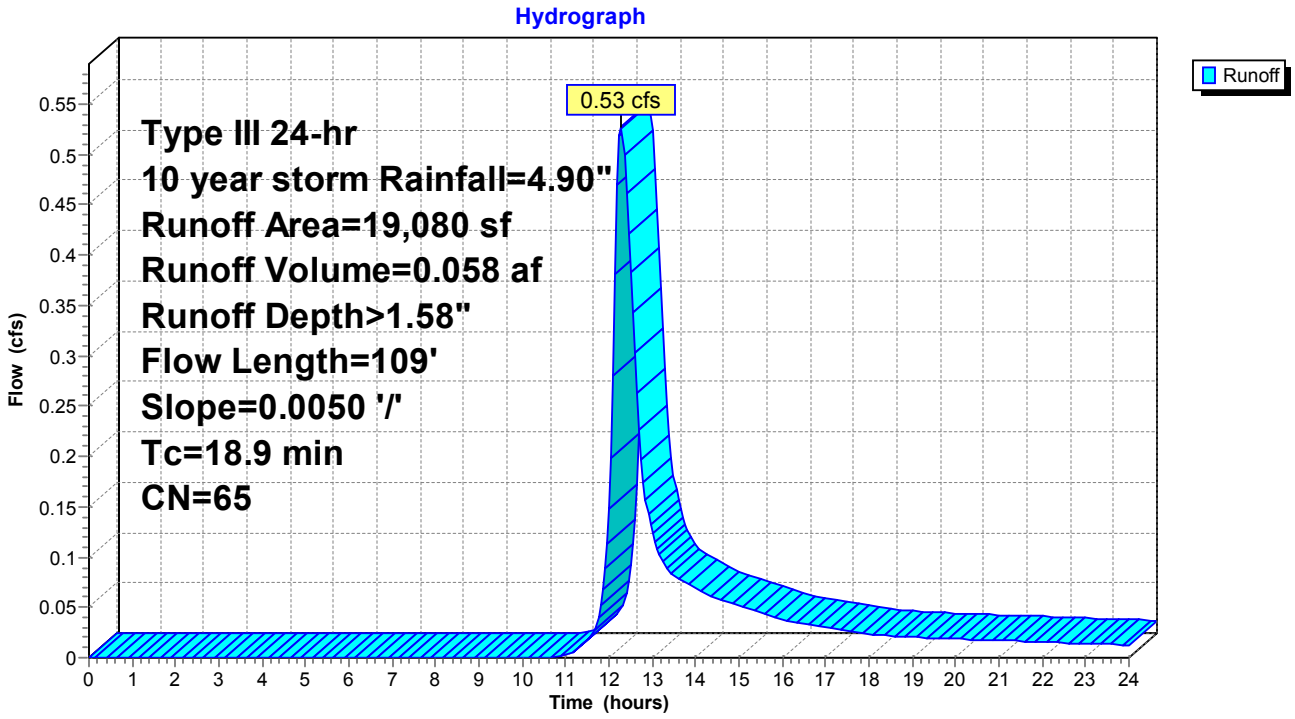
Runoff = 0.53 cfs @ 12.28 hrs, Volume= 0.058 af, Depth> 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 1: Existing Ground Area 1


Hydrograph
Runoff
0.53 cfs
Type III 24-hr
10 year storm Rainfall=4.90"
Runoff Area=19,080 sf
Runoff Volume=0.058 af
Runoff Depth>1.58"
Flow Length=109'
Slope=0.0050 '/'
Tc=18.9 min
CN=65
Flow (cfs)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Subcatchment Ex G 2: Existing Ground Area 2

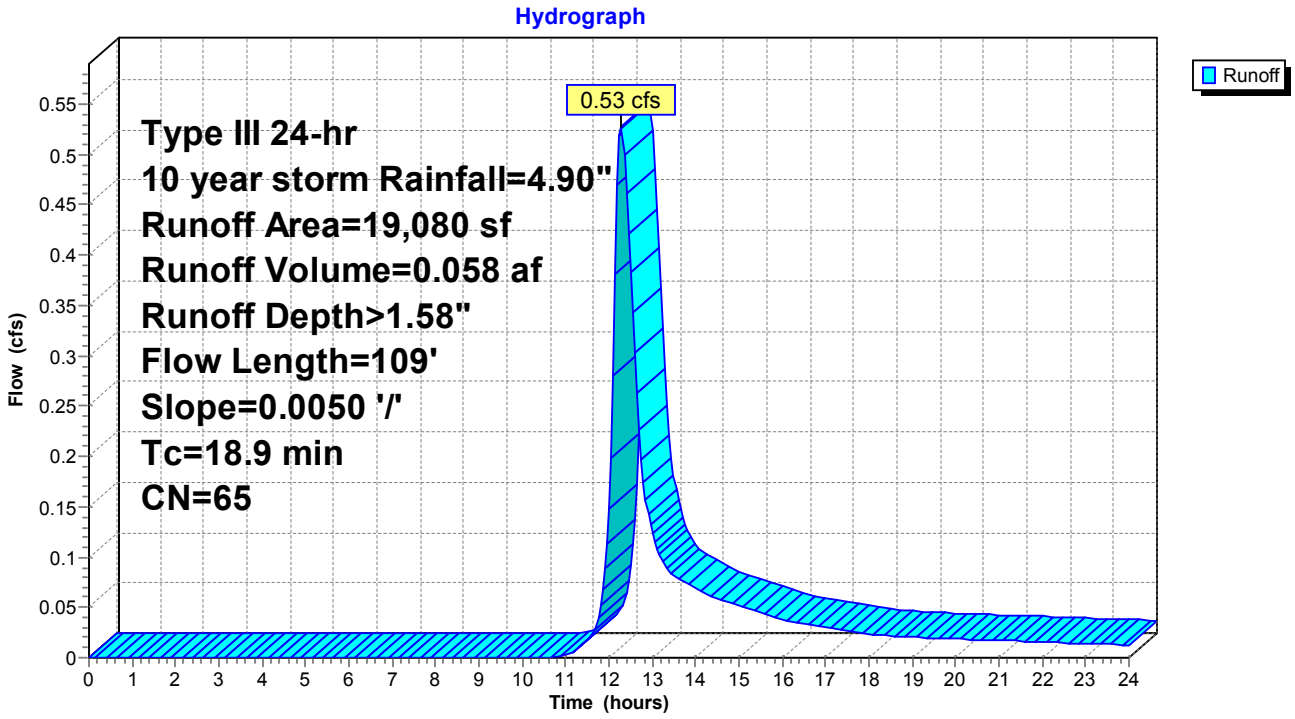
Runoff = 0.53 cfs @ 12.28 hrs, Volume= 0.058 af, Depth> 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 2: Existing Ground Area 2


Hydrograph
Runoff
0.53 cfs
Type III 24-hr
10 year storm Rainfall=4.90"
Runoff Area=19,080 sf
Runoff Volume=0.058 af
Runoff Depth>1.58"
Flow Length=109'
Slope=0.0050 '/'
Tc=18.9 min
CN=65
Flow (cfs)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Subcatchment Ex Trees: Existing Tree Area

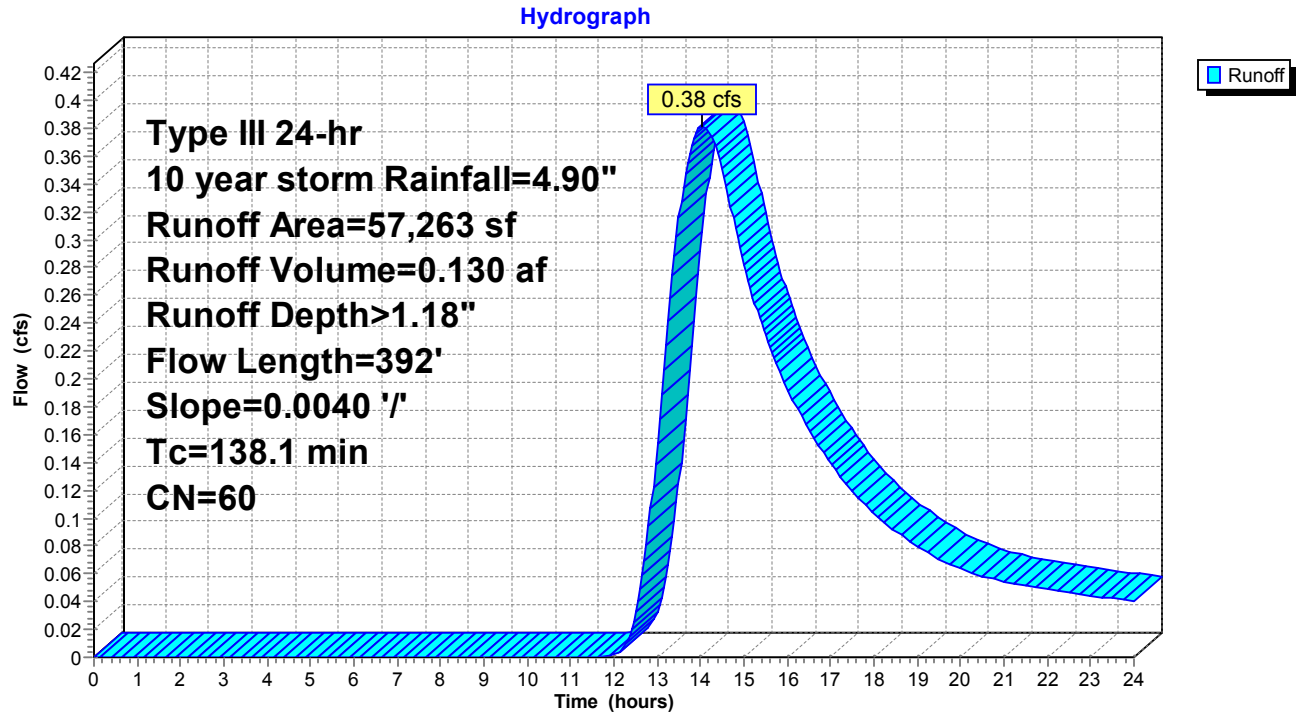
Runoff = 0.38 cfs @ 14.01 hrs, Volume= 0.130 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
57,263	60	Woods, Fair, HSG B
57,263		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
128.0	200	0.0040	0.03		**Sheet Flow, Natural Tree Area** Woods: Dense underbrush n= 0.800 P2= 3.00"
10.1	192	0.0040	0.32		**Shallow Concentrated Flow, Natural Tree Area** Woodland Kv= 5.0 fps
138.1	392	Total			

Subcatchment Ex Trees: Existing Tree Area



Summary for Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

Inflow Area = 4.220 ac, 40.66% Impervious, Inflow Depth > 2.13" for 10 year storm event
Inflow = 4.29 cfs @ 12.56 hrs, Volume= 0.748 af
Outflow = 4.26 cfs @ 12.62 hrs, Volume= 0.747 af, Atten= 1%, Lag= 3.4 min
Discarded = 4.26 cfs @ 12.62 hrs, Volume= 0.747 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.53' @ 12.62 hrs Surf.Area= 0.036 ac Storage= 0.017 af

Plug-Flow detention time= 2.7 min calculated for 0.746 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (822.0 - 819.5)

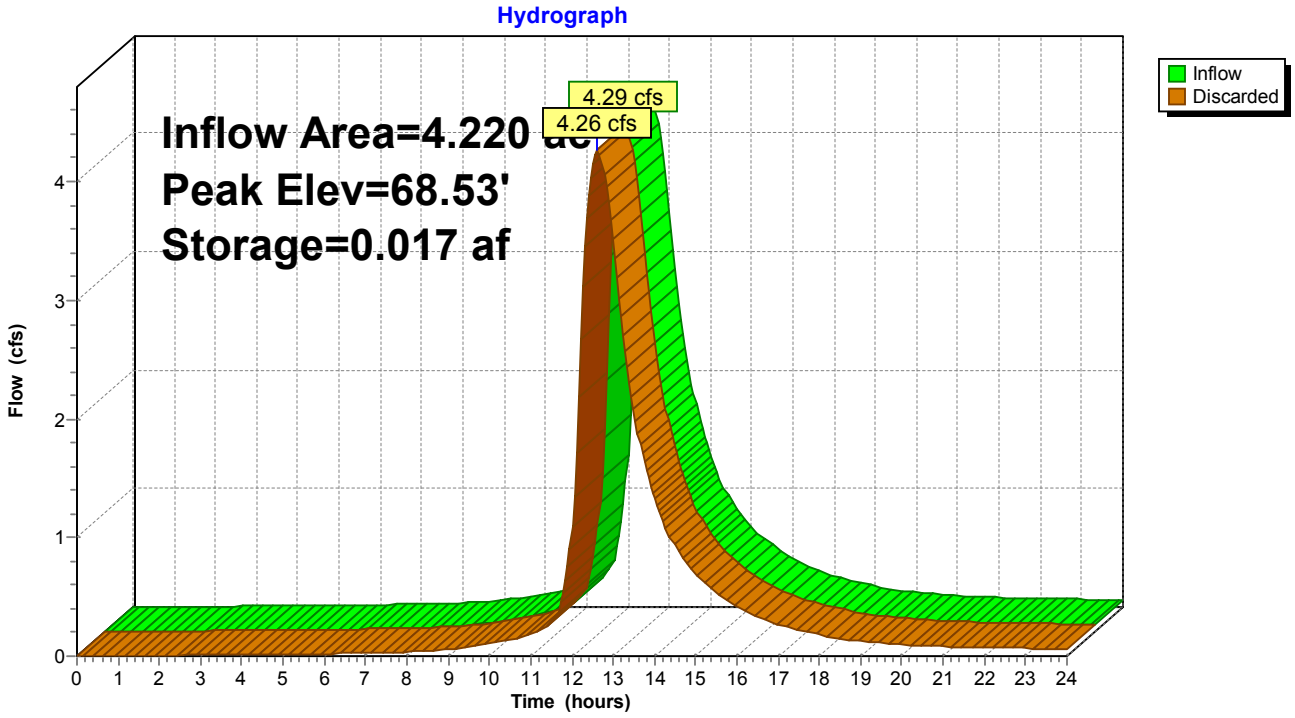
Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	0.569 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
68.00	0.028	0.000	0.000
69.00	0.043	0.036	0.036
70.00	0.063	0.053	0.089
71.00	0.091	0.077	0.166
72.00	0.121	0.106	0.272
73.00	0.148	0.134	0.406
74.00	0.179	0.163	0.569

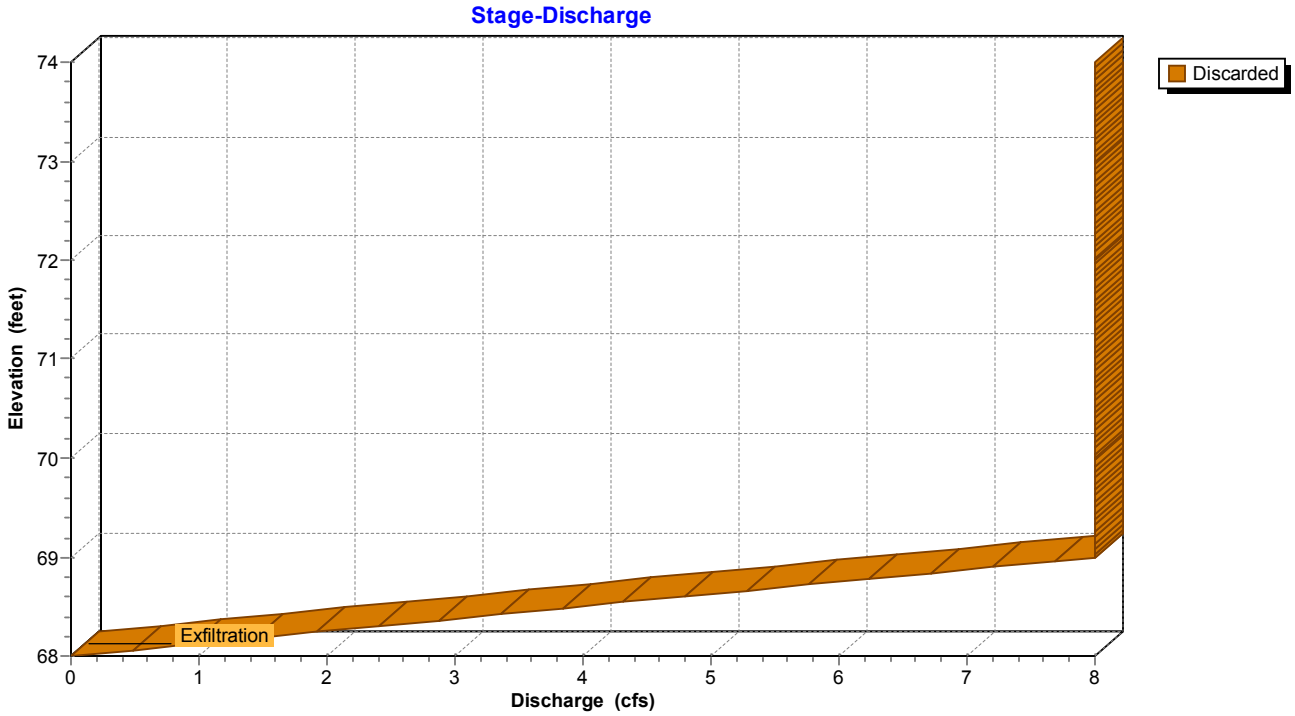
Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.00 cfs Exfiltration at all elevations** Phase-In= 1.00'

Discarded OutFlow Max=4.26 cfs @ 12.62 hrs HW=68.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 4.26 cfs)

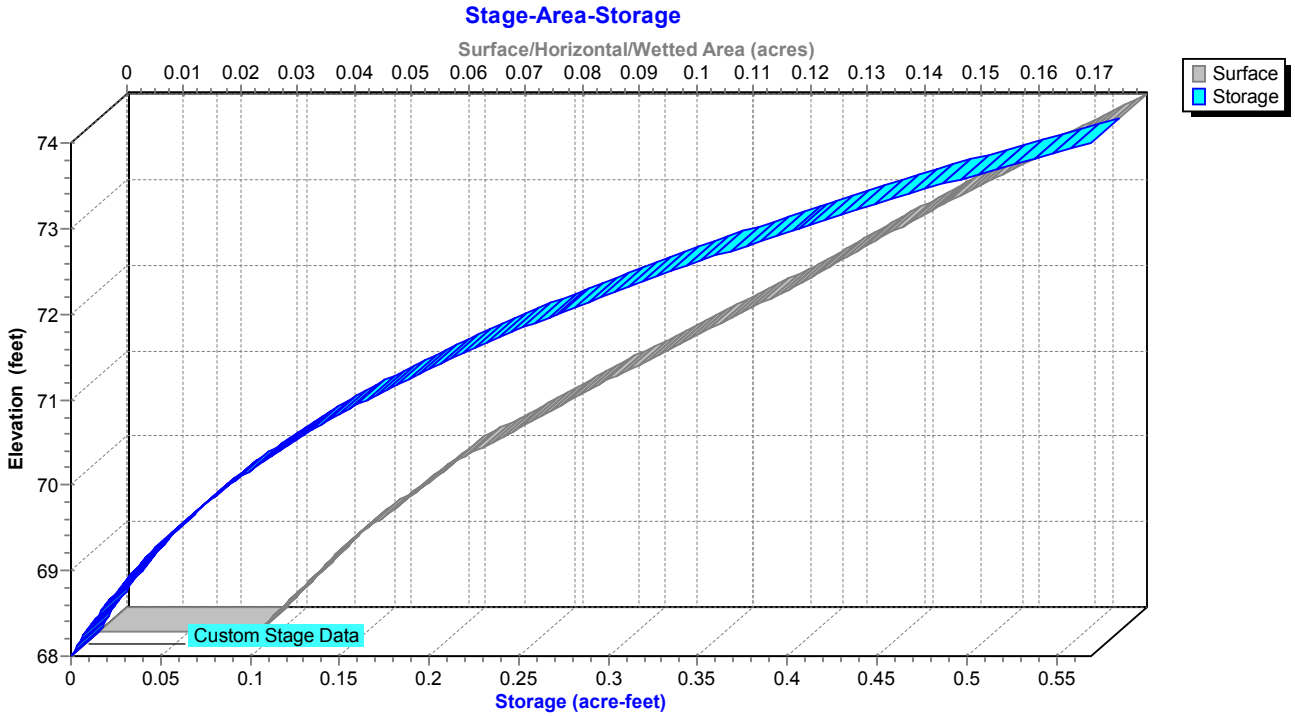
Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

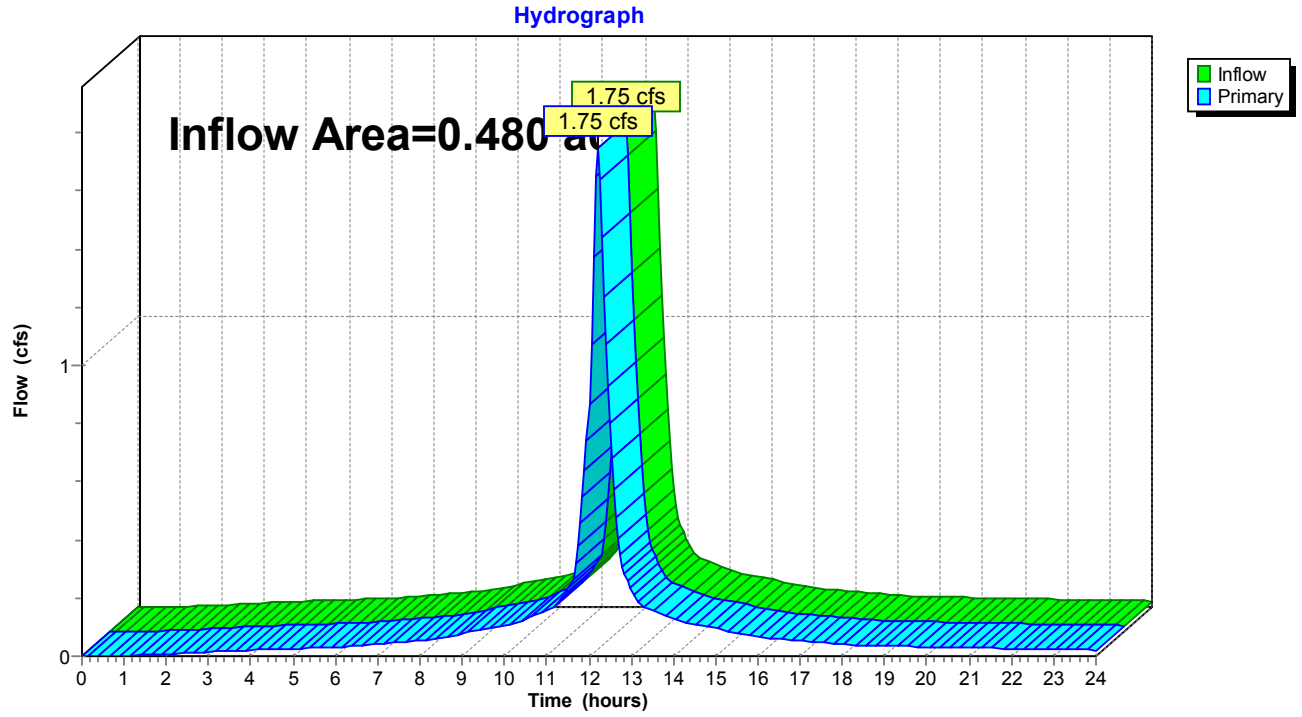


Summary for Pond W 1: Existing Wetland Area 1

Inflow Area = 0.480 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 1.75 cfs @ 12.20 hrs, Volume= 0.186 af
Primary = 1.75 cfs @ 12.20 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 1: Existing Wetland Area 1

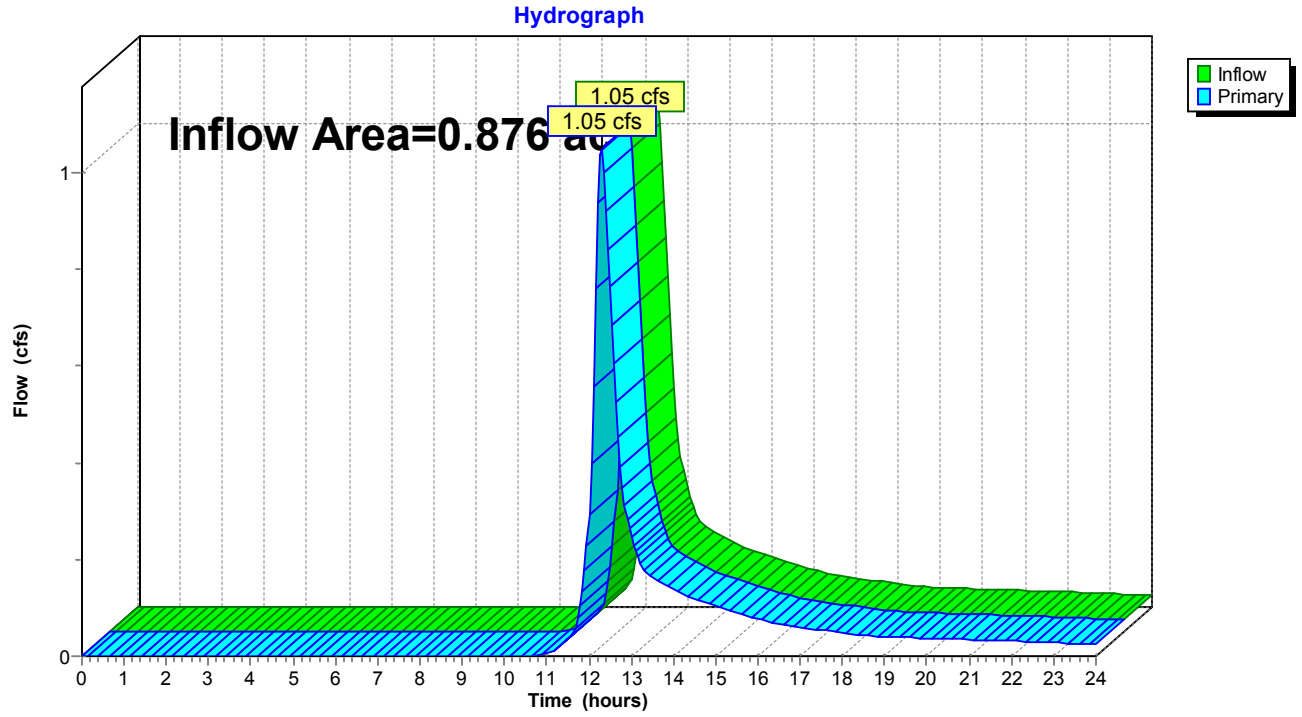


Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.876 ac, 0.00% Impervious, Inflow Depth > 1.58" for 10 year storm event
Inflow = 1.05 cfs @ 12.28 hrs, Volume= 0.115 af
Primary = 1.05 cfs @ 12.28 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2

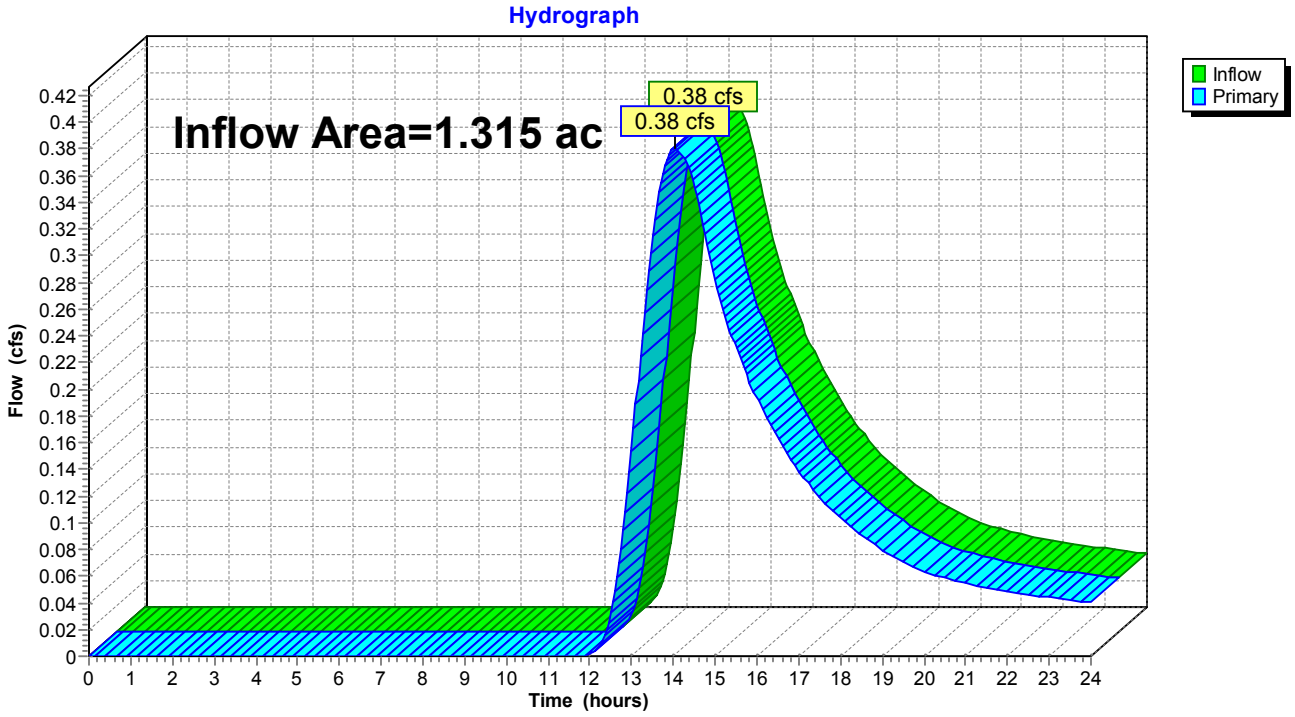


Summary for Pond W 3: Existing Wetland Area 3

Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth > 1.18" for 10 year storm event
Inflow = 0.38 cfs @ 14.01 hrs, Volume= 0.130 af
Primary = 0.38 cfs @ 14.01 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 3: Existing Wetland Area 3

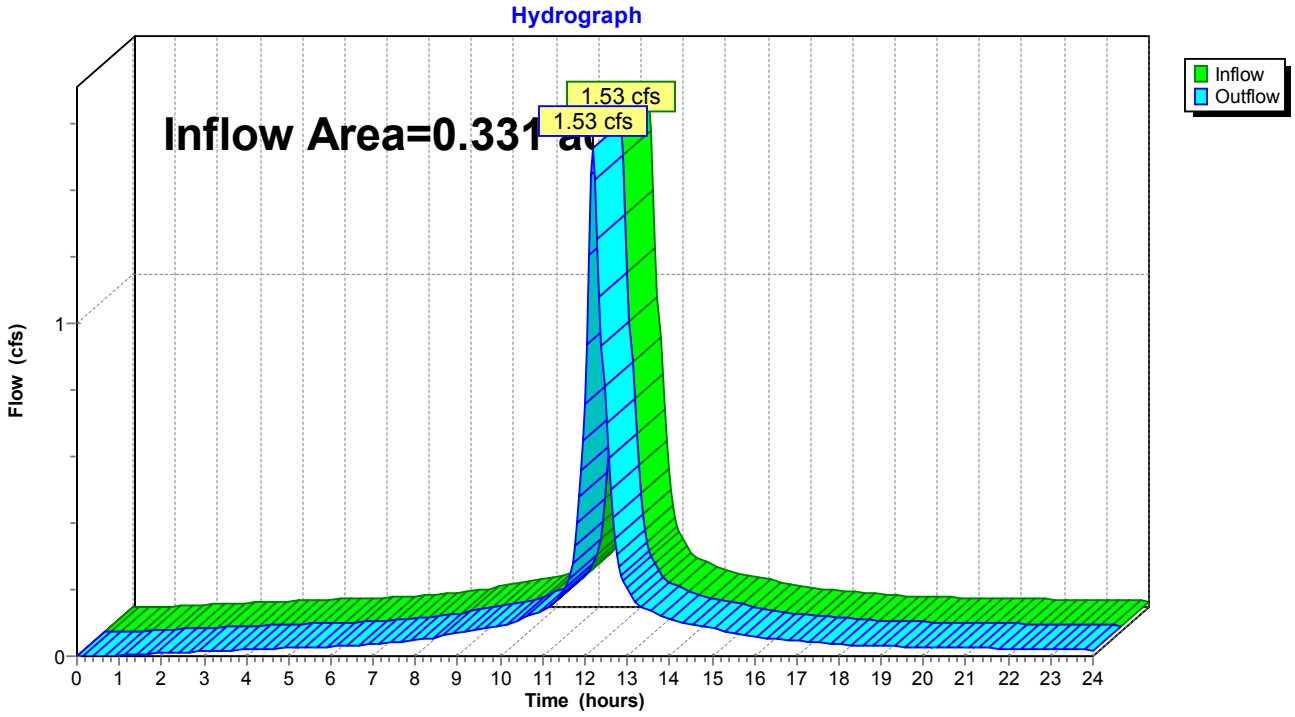


Summary for Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af
Outflow = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

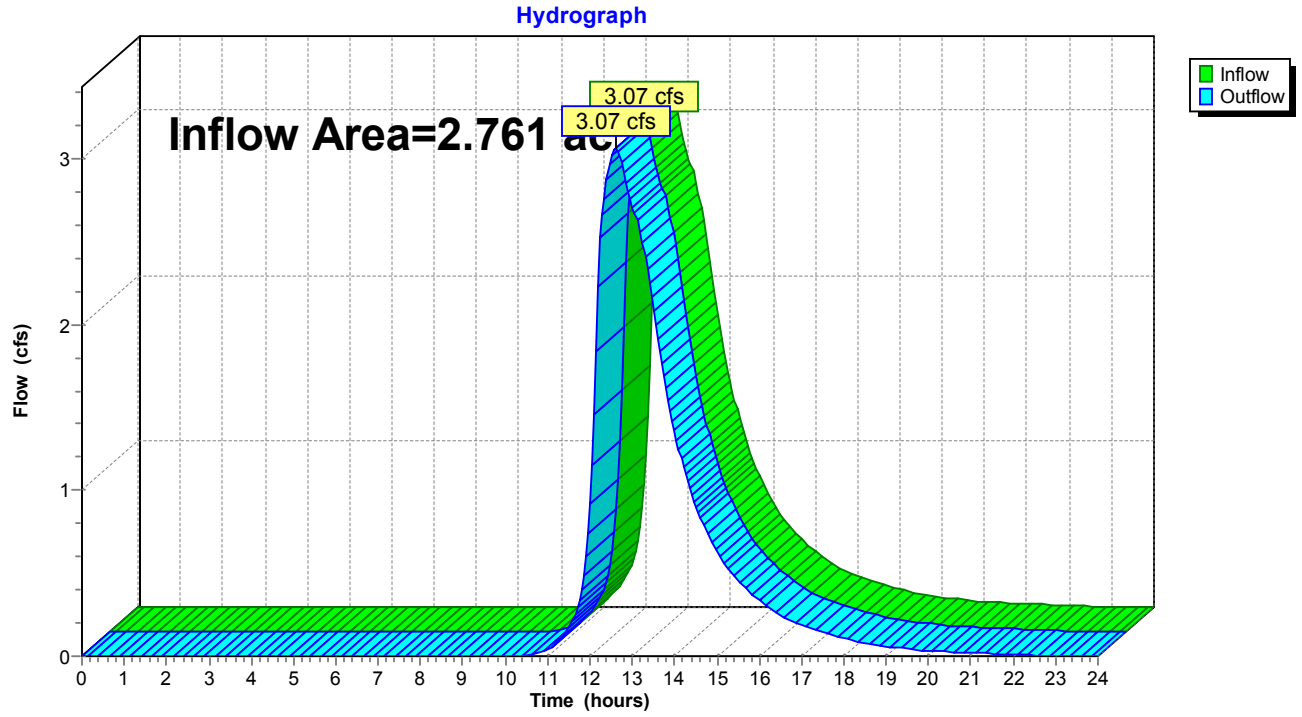


Summary for Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 2.48" for 25 year storm event
Inflow = 3.07 cfs @ 12.59 hrs, Volume= 0.571 af
Outflow = 3.07 cfs @ 12.59 hrs, Volume= 0.571 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

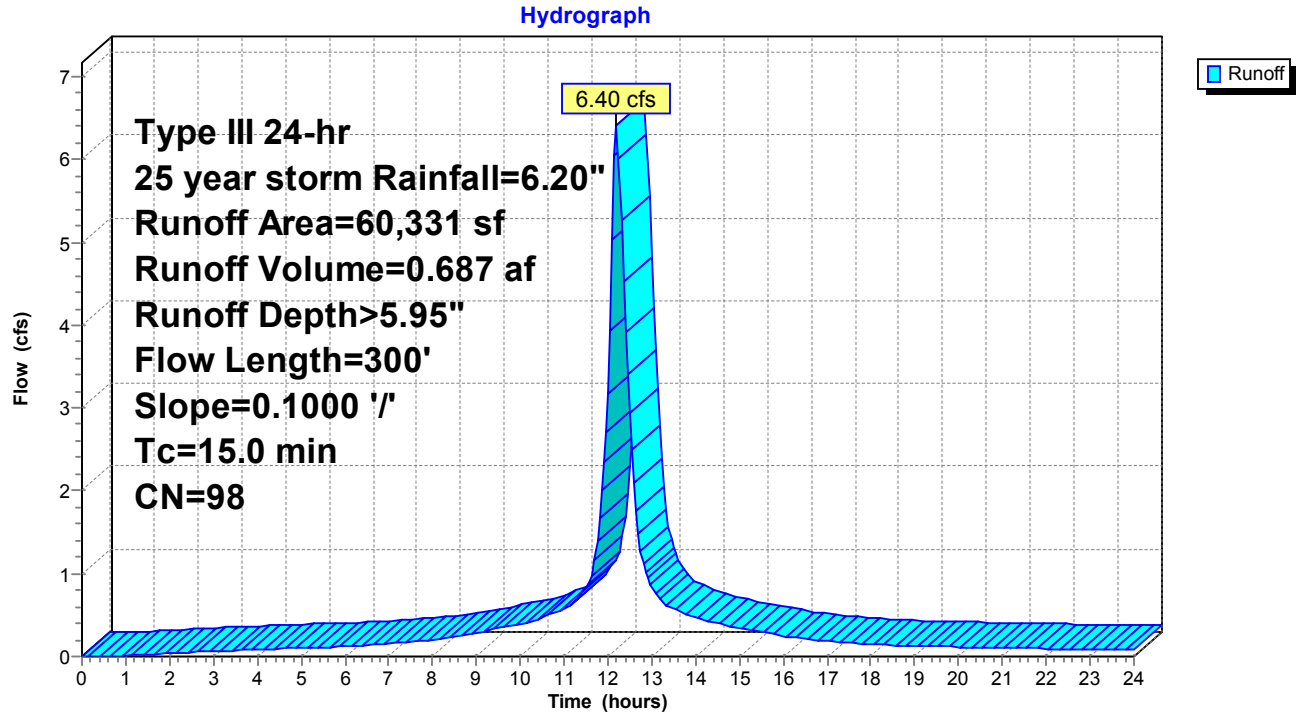
Runoff = 6.40 cfs @ 12.20 hrs, Volume= 0.687 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
60,331	98	Roofs, HSG A
60,331		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

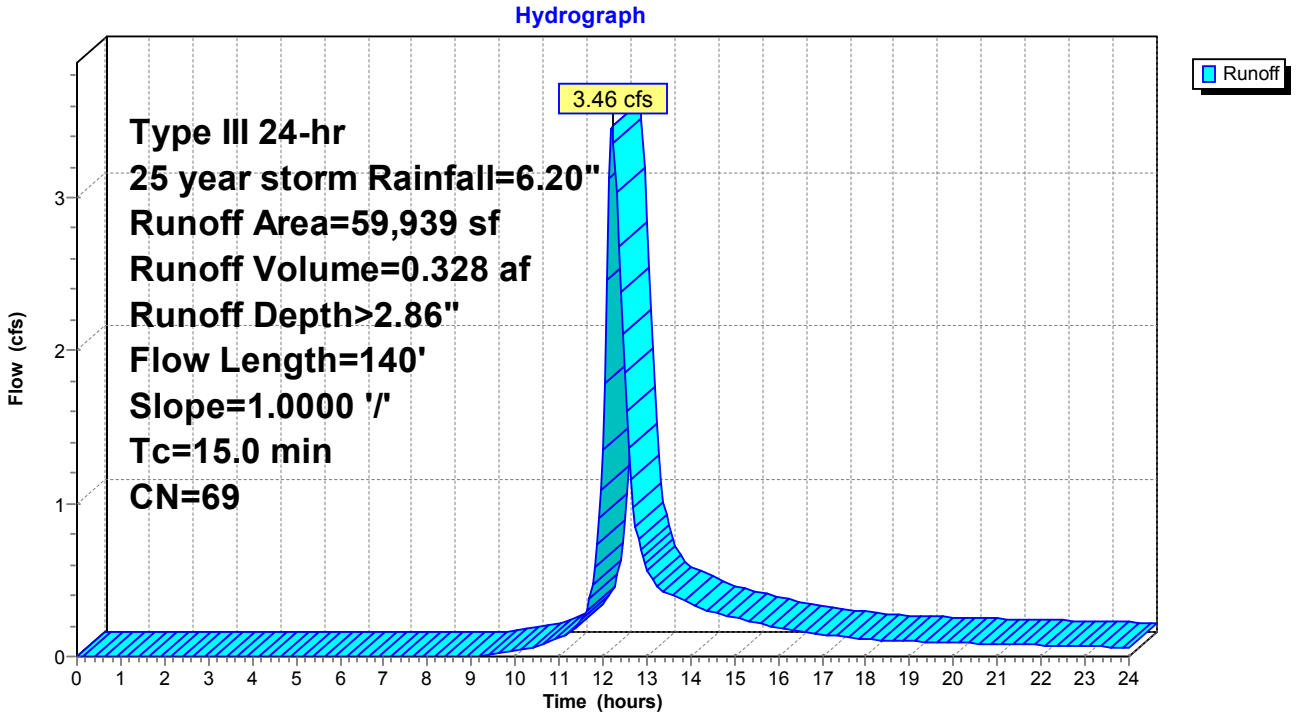
Runoff = 3.46 cfs @ 12.21 hrs, Volume= 0.328 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
59,939	69	50-75% Grass cover, Fair, HSG B
59,939		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

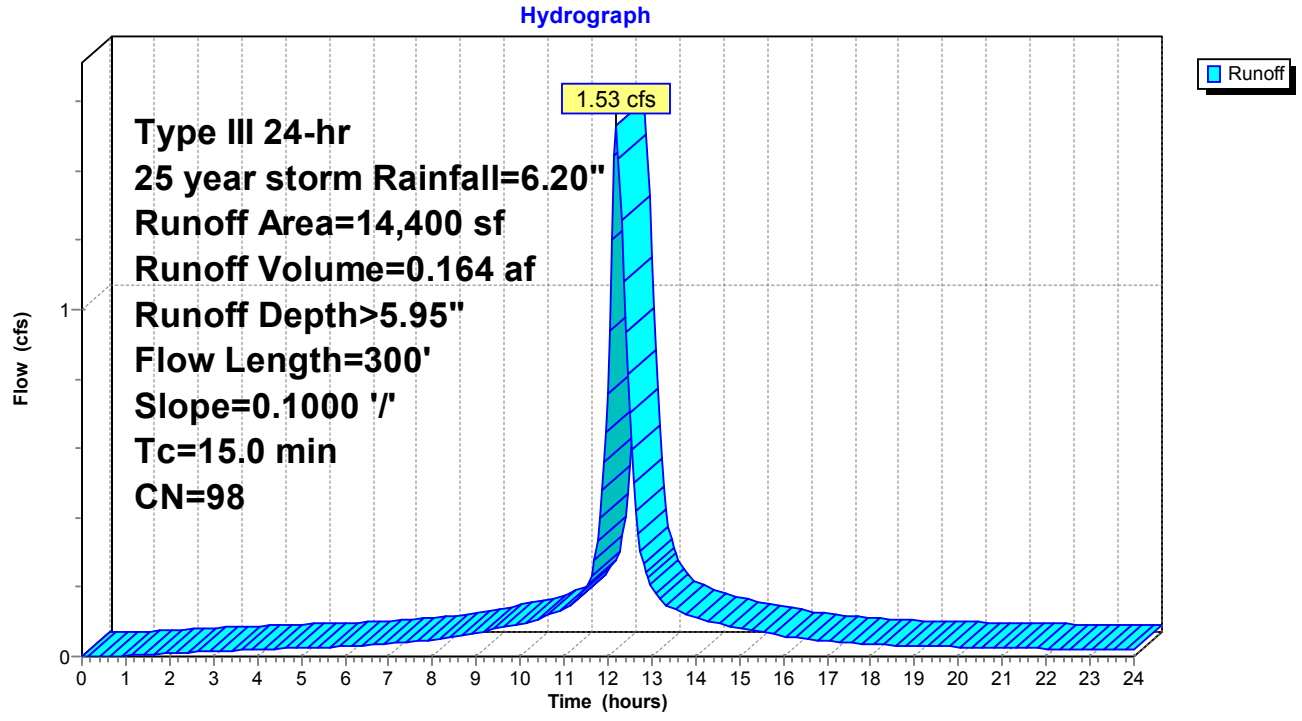
Runoff = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland

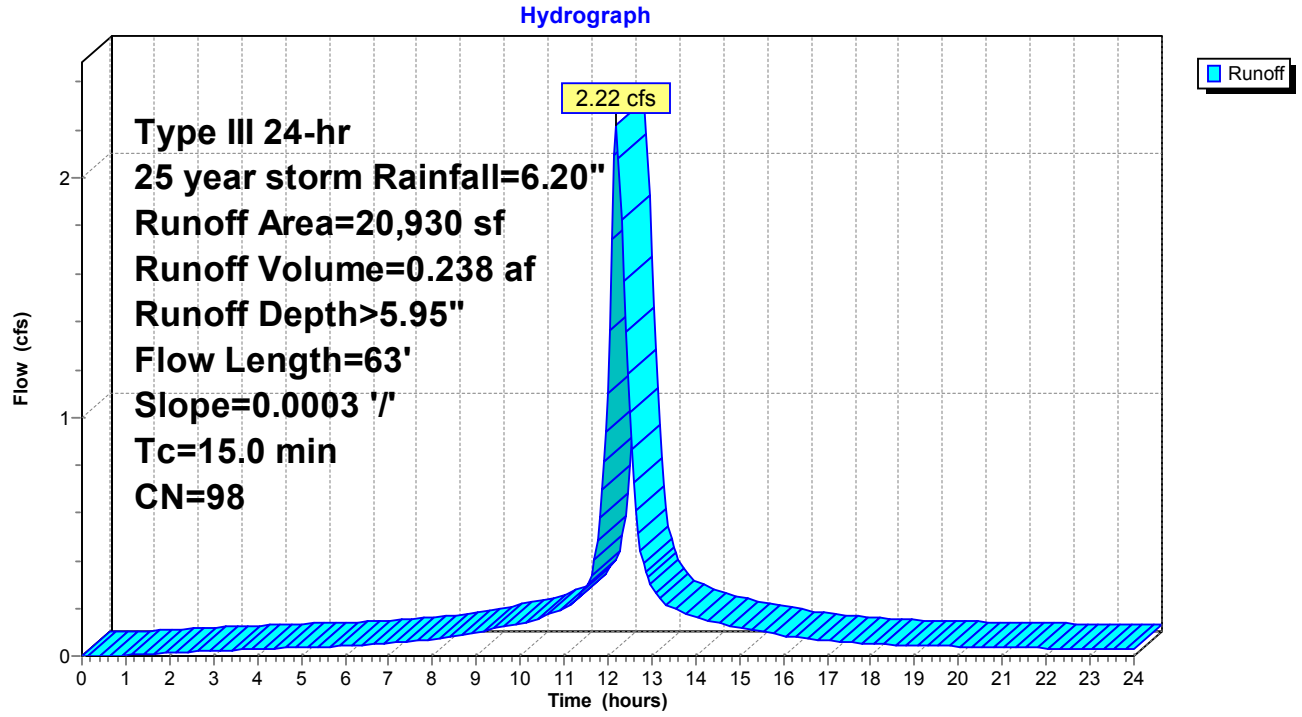
Runoff = 2.22 cfs @ 12.20 hrs, Volume= 0.238 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland



ummary for Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Bas

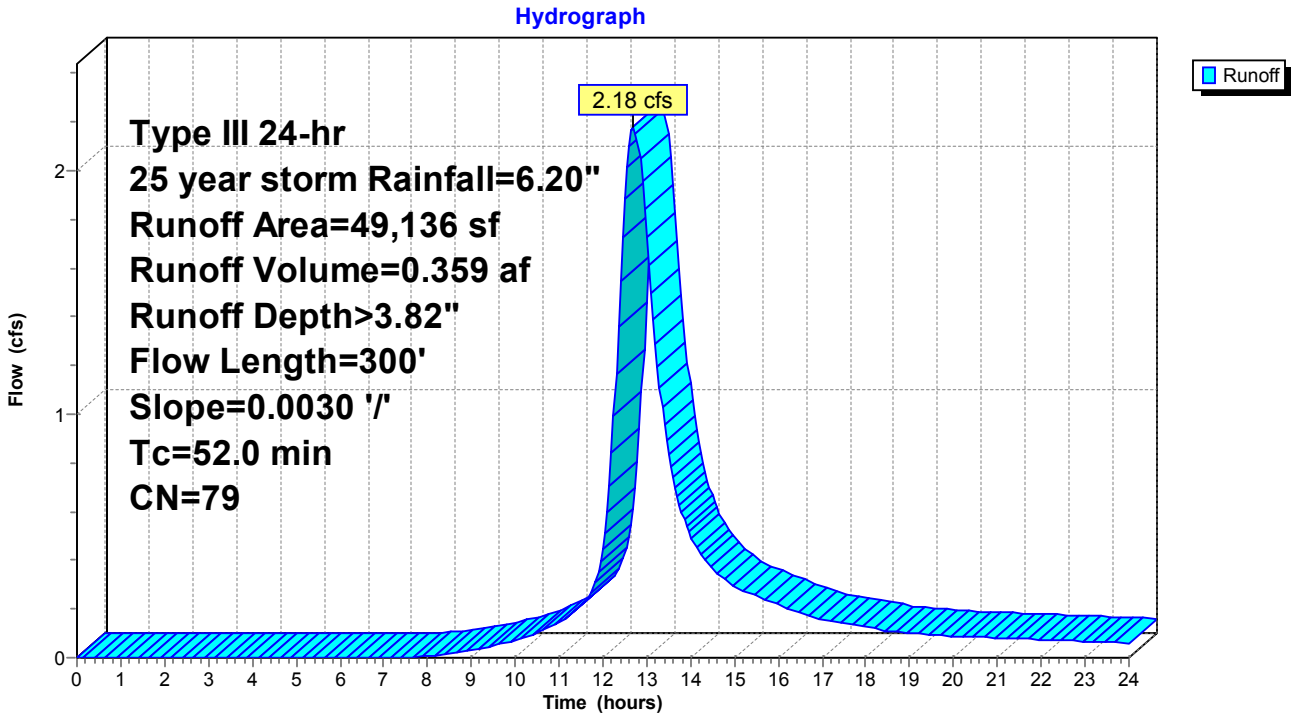
Runoff = 2.18 cfs @ 12.70 hrs, Volume= 0.359 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
49,136	79	<50% Grass cover, Poor, HSG B
49,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.0	300	0.0030	0.10		**Sheet Flow, overland runoff toward basin** Grass: Short n= 0.150 P2= 3.00"

Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Basin



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 4.41" for 25 year storm event
Inflow = 9.85 cfs @ 12.20 hrs, Volume= 1.015 af
Outflow = 3.59 cfs @ 12.59 hrs, Volume= 0.934 af, Atten= 64%, Lag= 23.3 min
Discarded = 0.52 cfs @ 12.59 hrs, Volume= 0.364 af
Secondary = 3.07 cfs @ 12.59 hrs, Volume= 0.571 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.19' @ 12.59 hrs Surf.Area= 0.251 ac Storage= 0.375 af

Plug-Flow detention time= 120.5 min calculated for 0.932 af (92% of inflow)
Center-of-Mass det. time= 79.2 min (861.2 - 782.0)

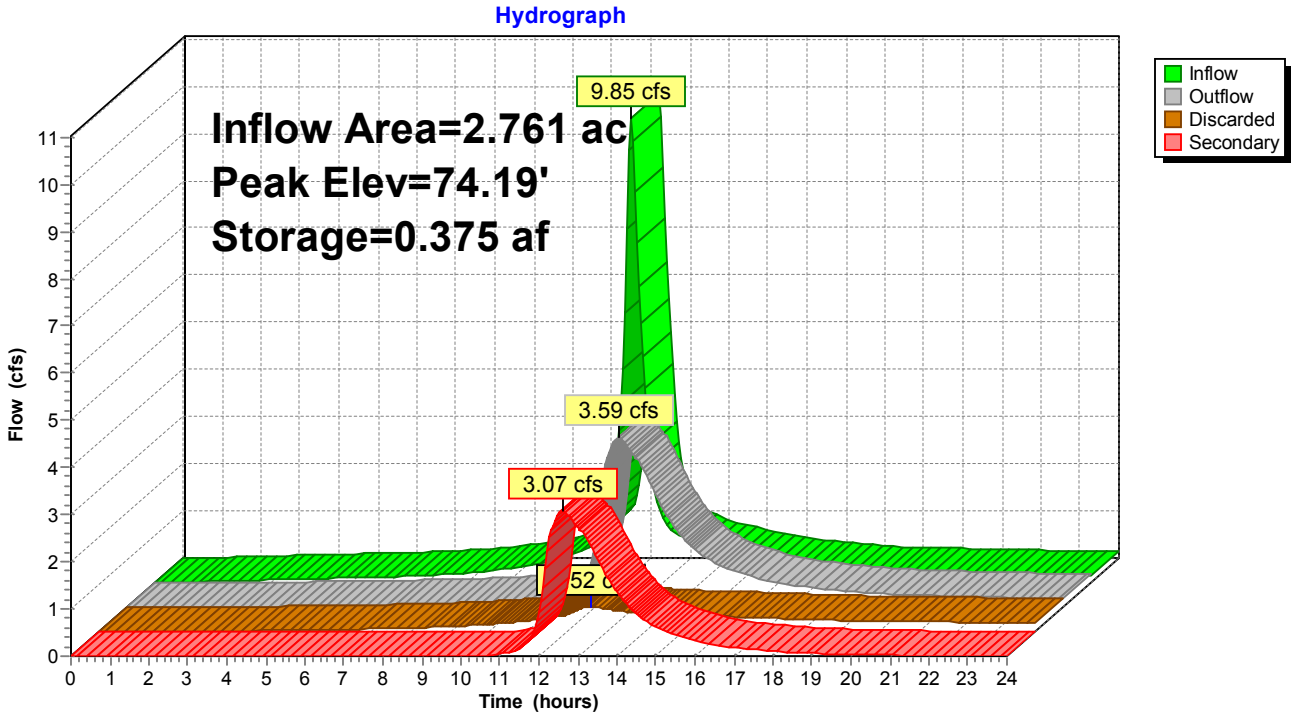
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Discarded	72.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 61.00' Phase-In= 1.00'

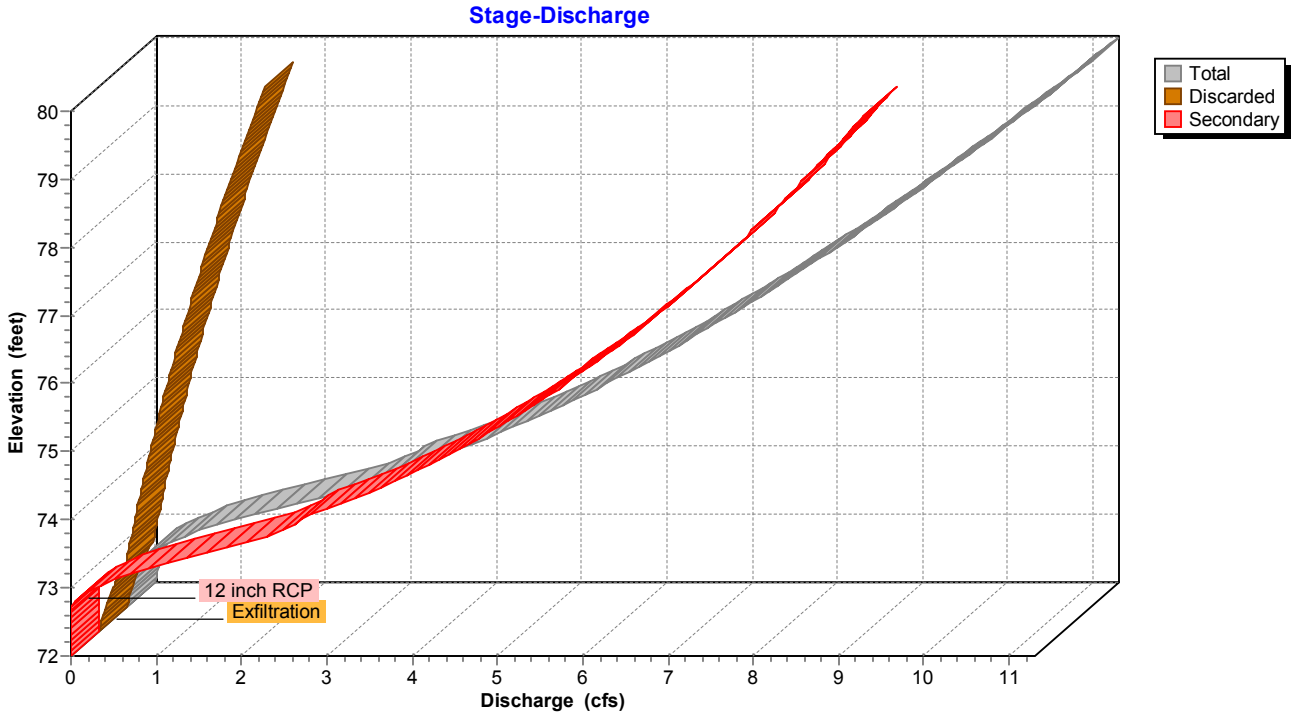
Discarded OutFlow Max=0.52 cfs @ 12.59 hrs HW=74.19' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.52 cfs)

Secondary OutFlow Max=3.07 cfs @ 12.59 hrs HW=74.19' (Free Discharge)
↑—**1=12 inch RCP** (Barrel Controls 3.07 cfs @ 3.91 fps)

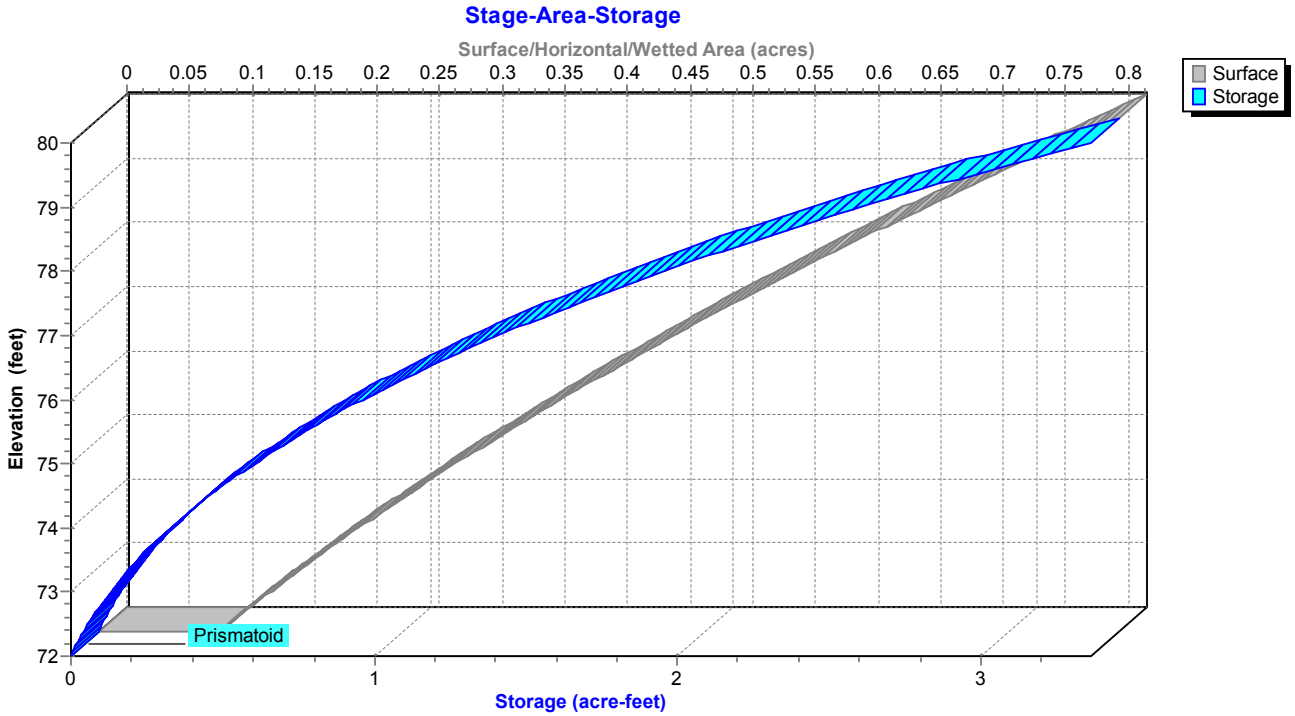
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area


Stage-Area-Storage
Surface/Horizontal/Wetted Area (acres)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8
Surface
Storage
Elevation (feet)
80 79 78 77 76 75 74 73 72
Prismatoid
0 1 2 3
Storage (acre-feet)

Summary for Subcatchment Ex G 1: Existing Ground Area 1

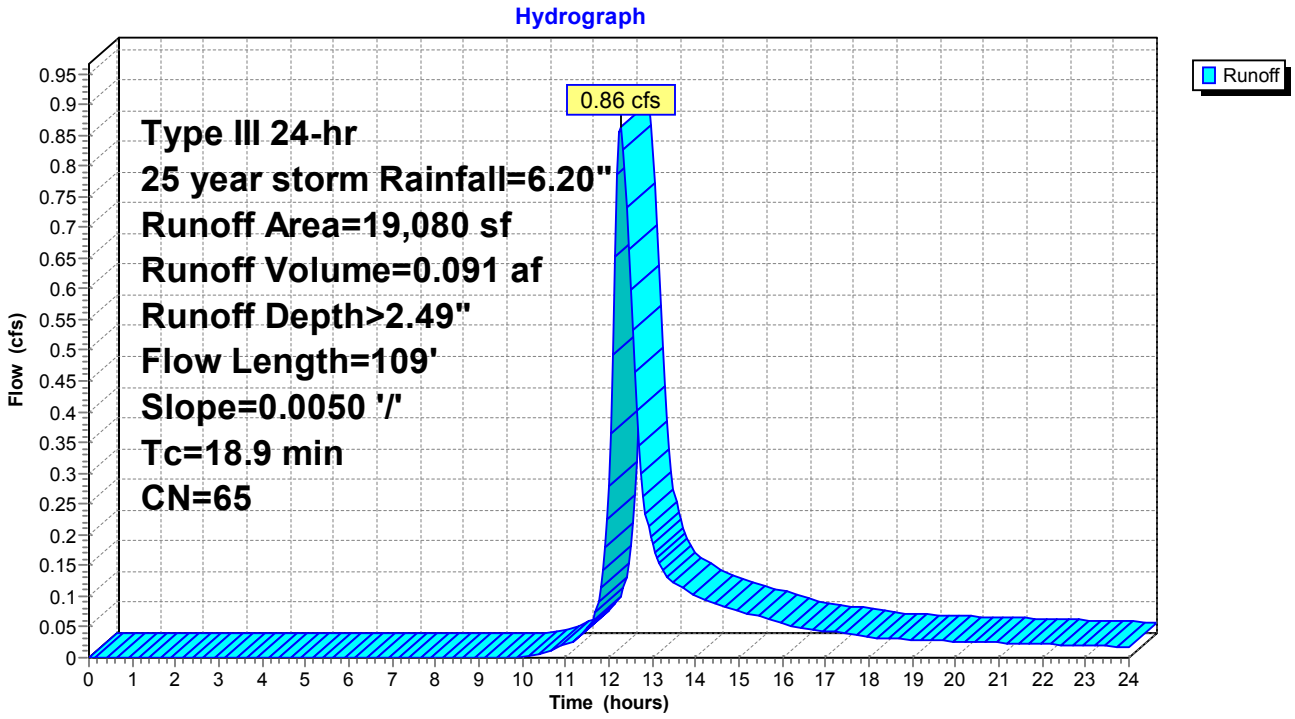
Runoff = 0.86 cfs @ 12.27 hrs, Volume= 0.091 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 1: Existing Ground Area 1



Summary for Subcatchment Ex G 2: Existing Ground Area 2

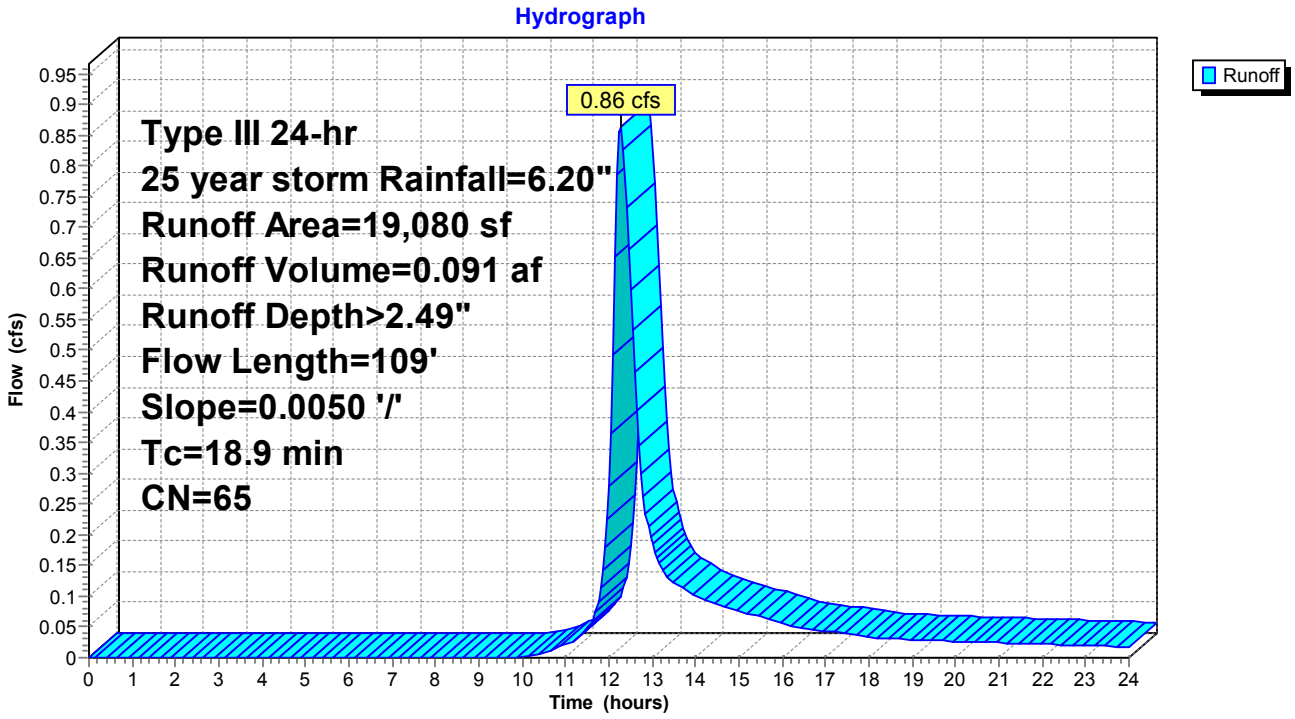
Runoff = 0.86 cfs @ 12.27 hrs, Volume= 0.091 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 2: Existing Ground Area 2



Summary for Subcatchment Ex Trees: Existing Tree Area

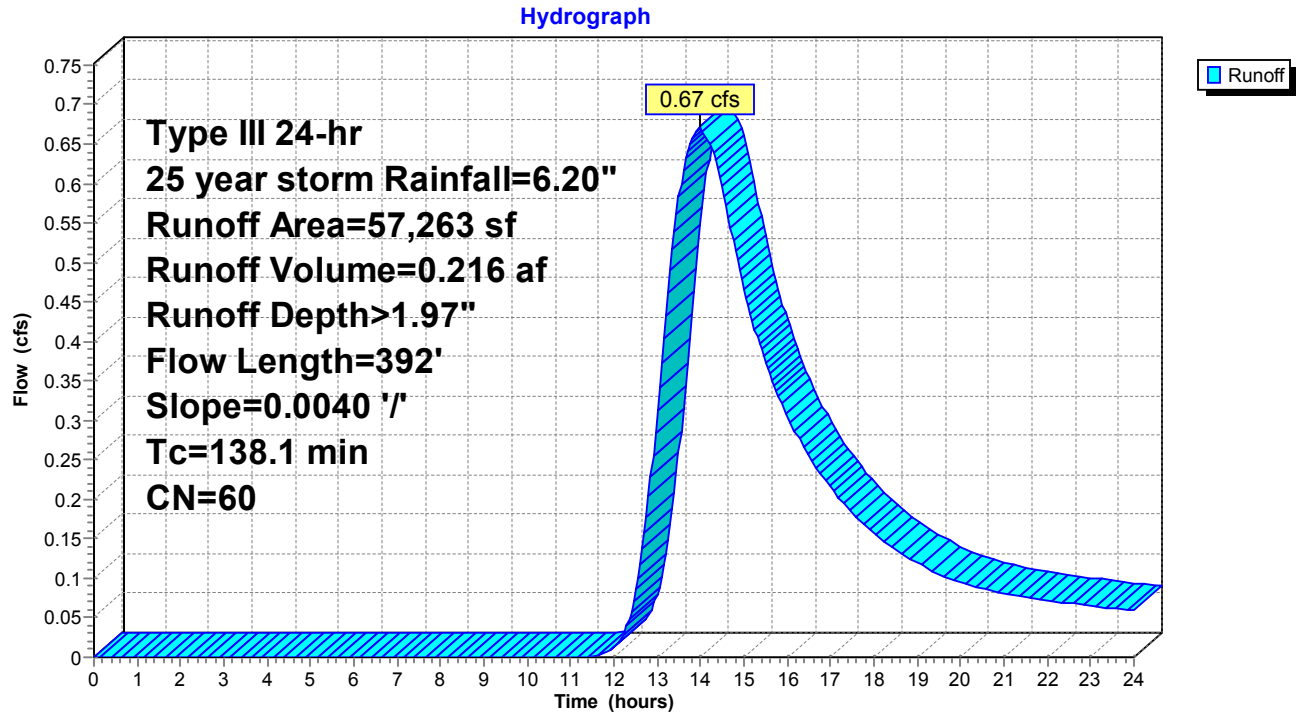
Runoff = 0.67 cfs @ 13.97 hrs, Volume= 0.216 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
57,263	60	Woods, Fair, HSG B
57,263		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
128.0	200	0.0040	0.03		**Sheet Flow, Natural Tree Area** Woods: Dense underbrush n= 0.800 P2= 3.00"
10.1	192	0.0040	0.32		**Shallow Concentrated Flow, Natural Tree Area** Woodland Kv= 5.0 fps
138.1	392	Total			

Subcatchment Ex Trees: Existing Tree Area


Hydrograph
Runoff
0.67 cfs
Type III 24-hr
25 year storm Rainfall=6.20"
Runoff Area=57,263 sf
Runoff Volume=0.216 af
Runoff Depth>1.97"
Flow Length=392'
Slope=0.0040 '/'
Tc=138.1 min
CN=60
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

Inflow Area = 4.220 ac, 40.66% Impervious, Inflow Depth > 3.11" for 25 year storm event
Inflow = 5.68 cfs @ 12.58 hrs, Volume= 1.094 af
Outflow = 5.64 cfs @ 12.64 hrs, Volume= 1.093 af, Atten= 1%, Lag= 3.7 min
Discarded = 5.64 cfs @ 12.64 hrs, Volume= 1.093 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.71' @ 12.64 hrs Surf.Area= 0.039 ac Storage= 0.023 af

Plug-Flow detention time= 2.8 min calculated for 1.091 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (822.5 - 819.9)

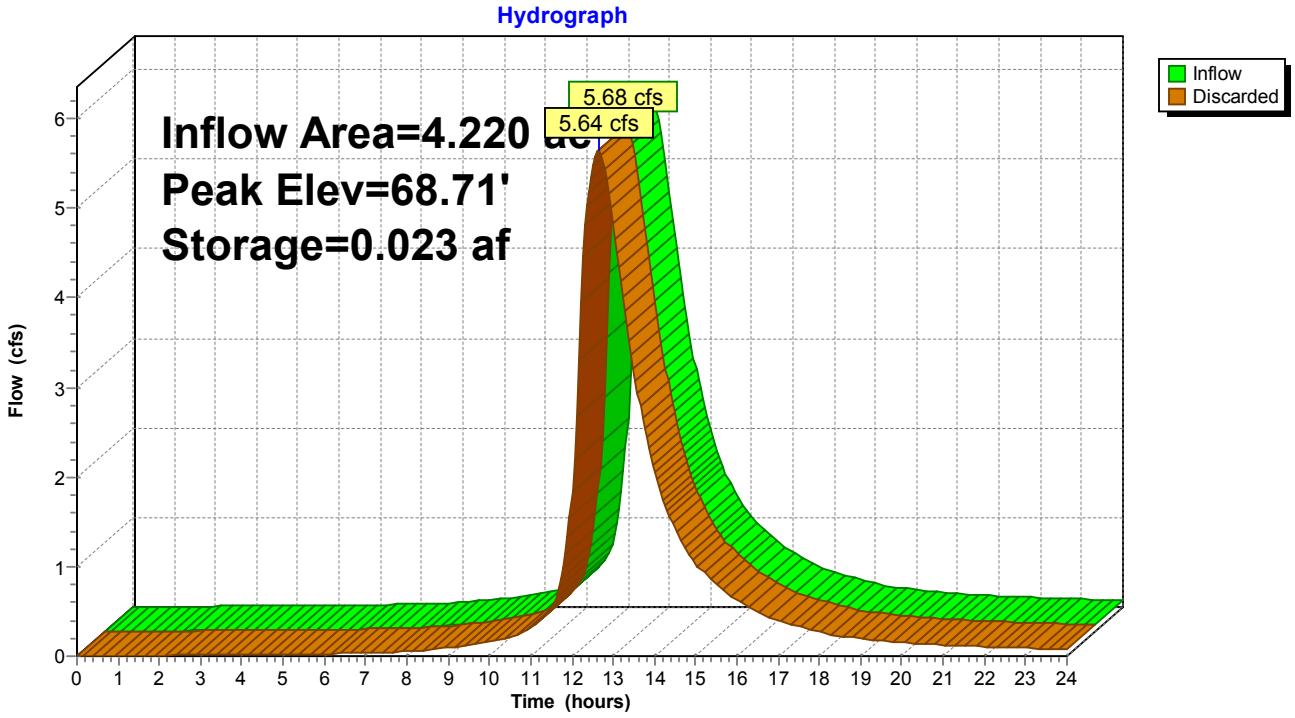
Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	0.569 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
68.00	0.028	0.000	0.000
69.00	0.043	0.036	0.036
70.00	0.063	0.053	0.089
71.00	0.091	0.077	0.166
72.00	0.121	0.106	0.272
73.00	0.148	0.134	0.406
74.00	0.179	0.163	0.569

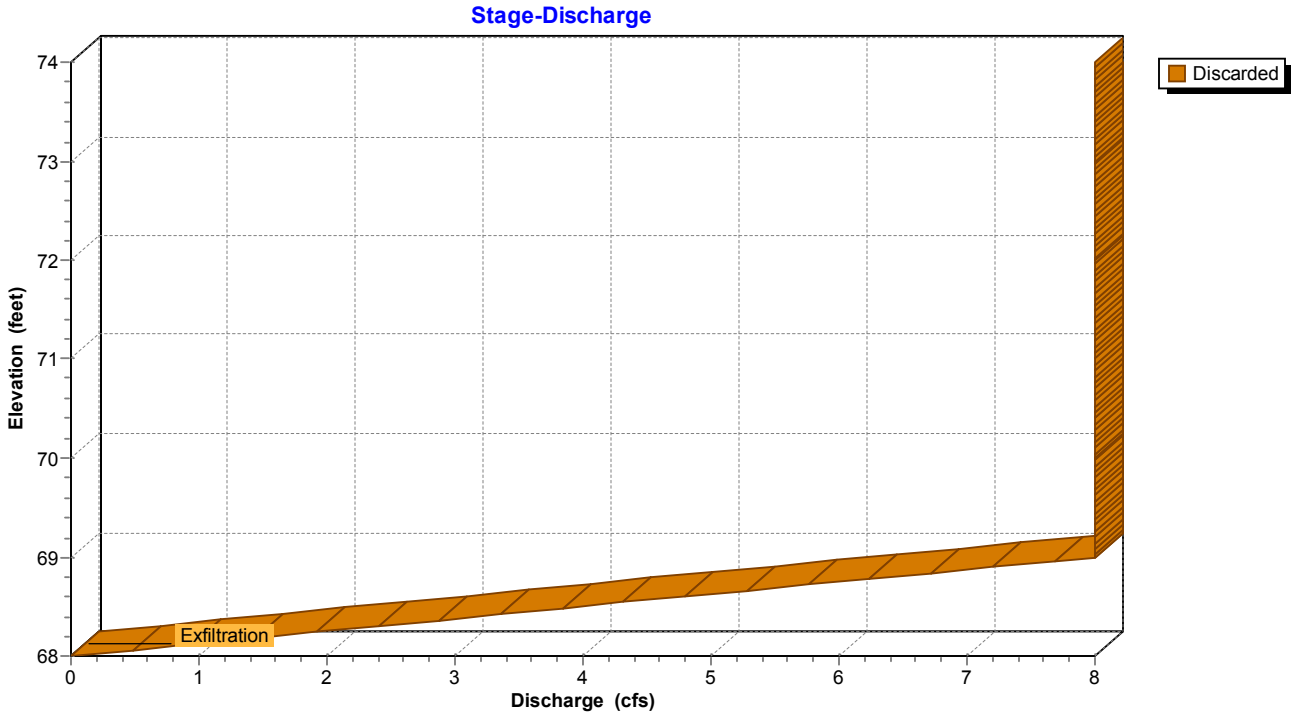
Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.00 cfs Exfiltration at all elevations** Phase-In= 1.00'

Discarded OutFlow Max=5.64 cfs @ 12.64 hrs HW=68.71' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 5.64 cfs)

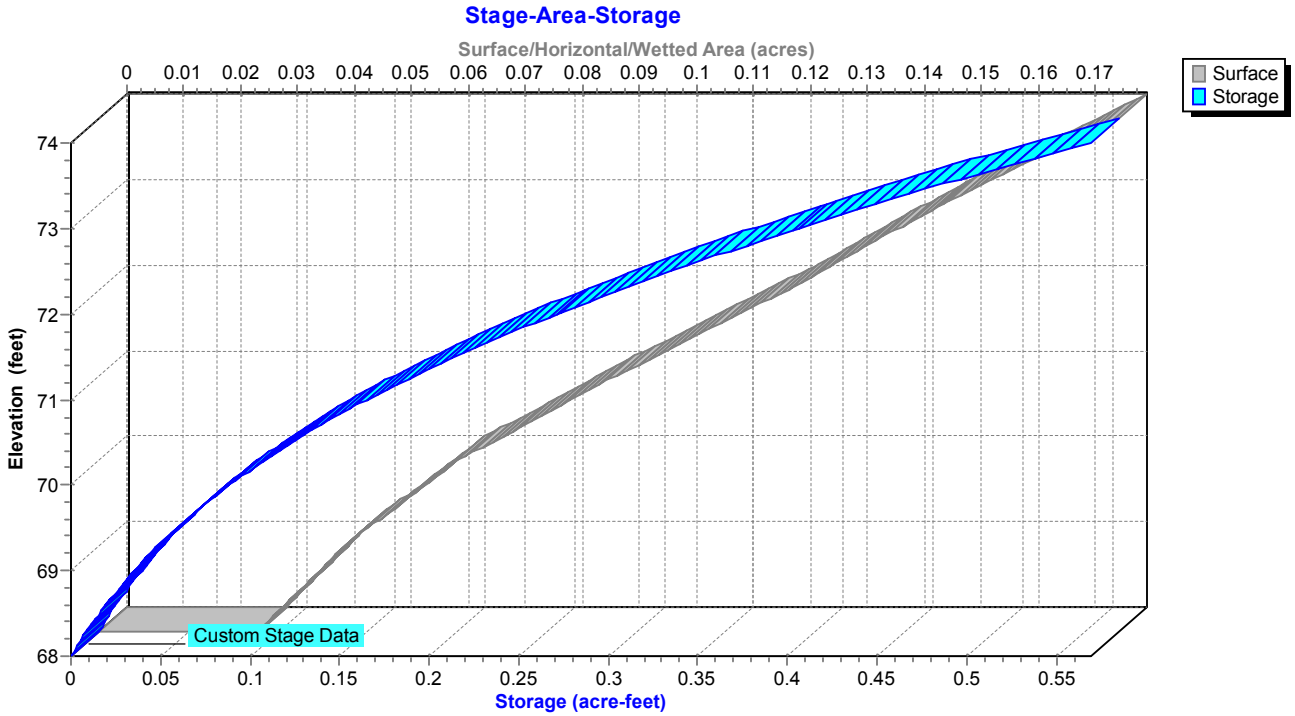
Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

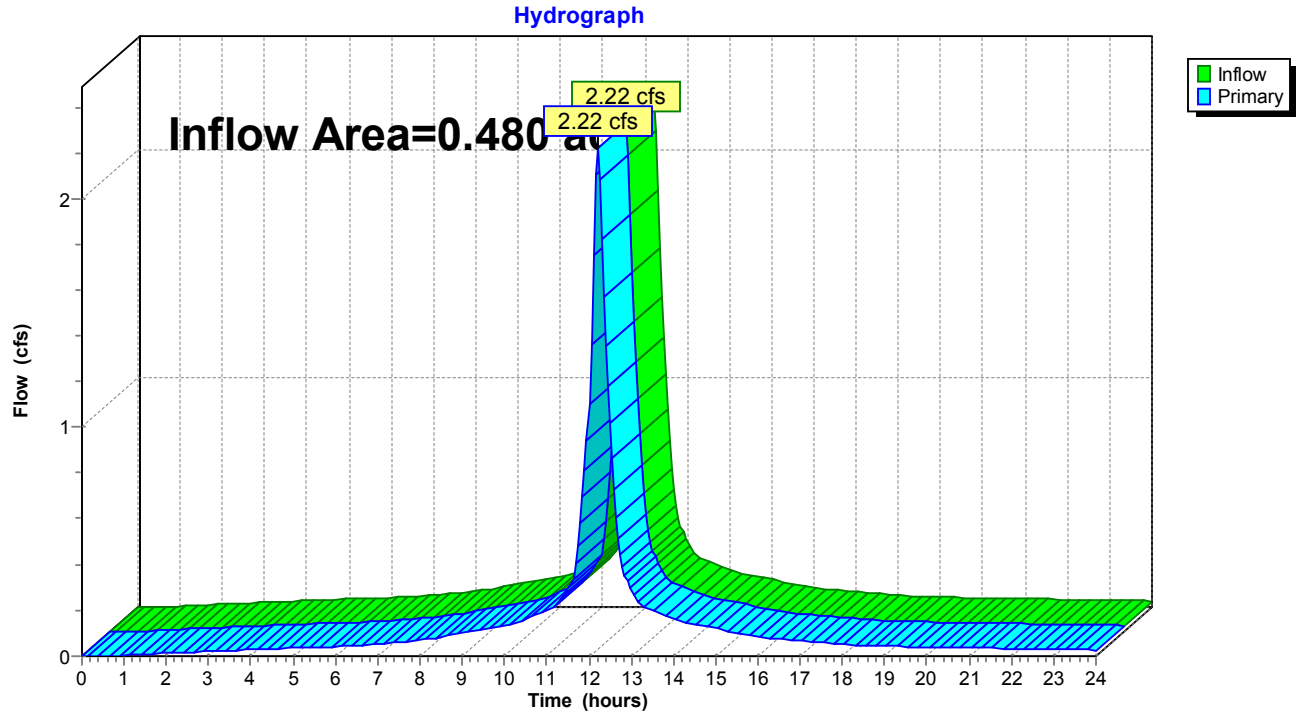


Summary for Pond W 1: Existing Wetland Area 1

Inflow Area = 0.480 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 2.22 cfs @ 12.20 hrs, Volume= 0.238 af
Primary = 2.22 cfs @ 12.20 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 1: Existing Wetland Area 1

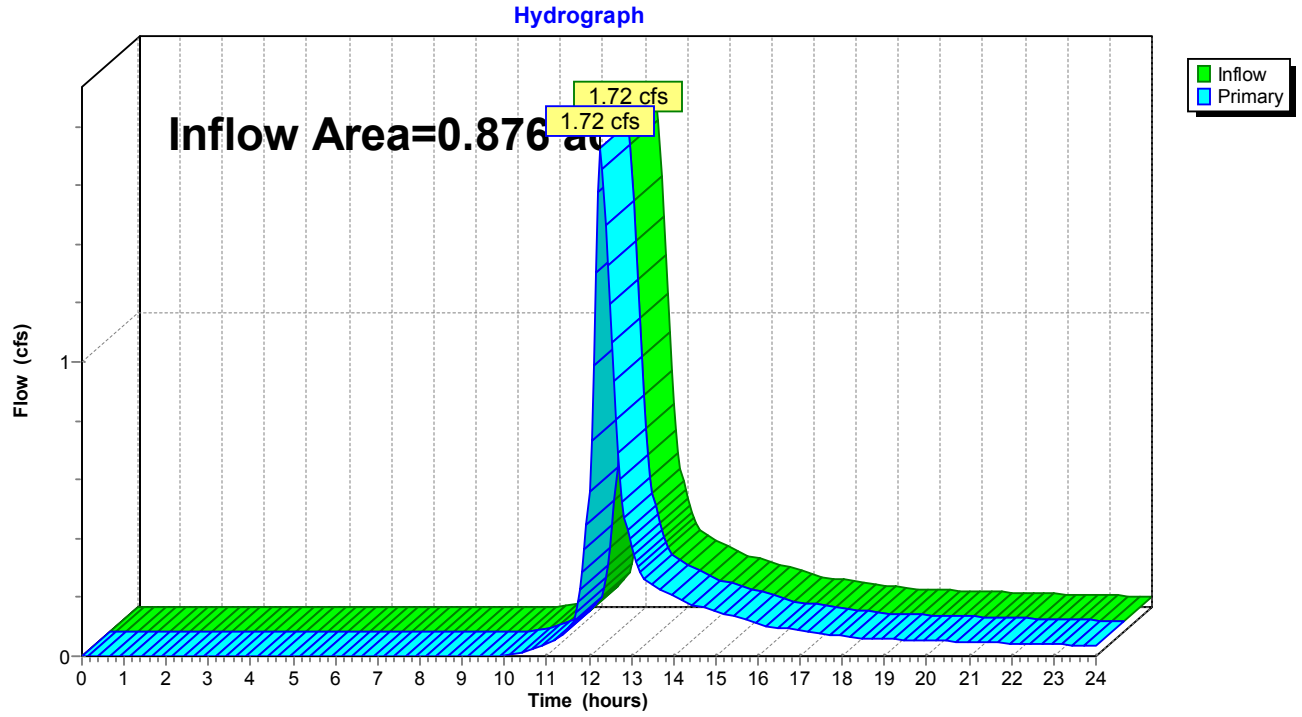


Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.876 ac, 0.00% Impervious, Inflow Depth > 2.49" for 25 year storm event
Inflow = 1.72 cfs @ 12.27 hrs, Volume= 0.182 af
Primary = 1.72 cfs @ 12.27 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2

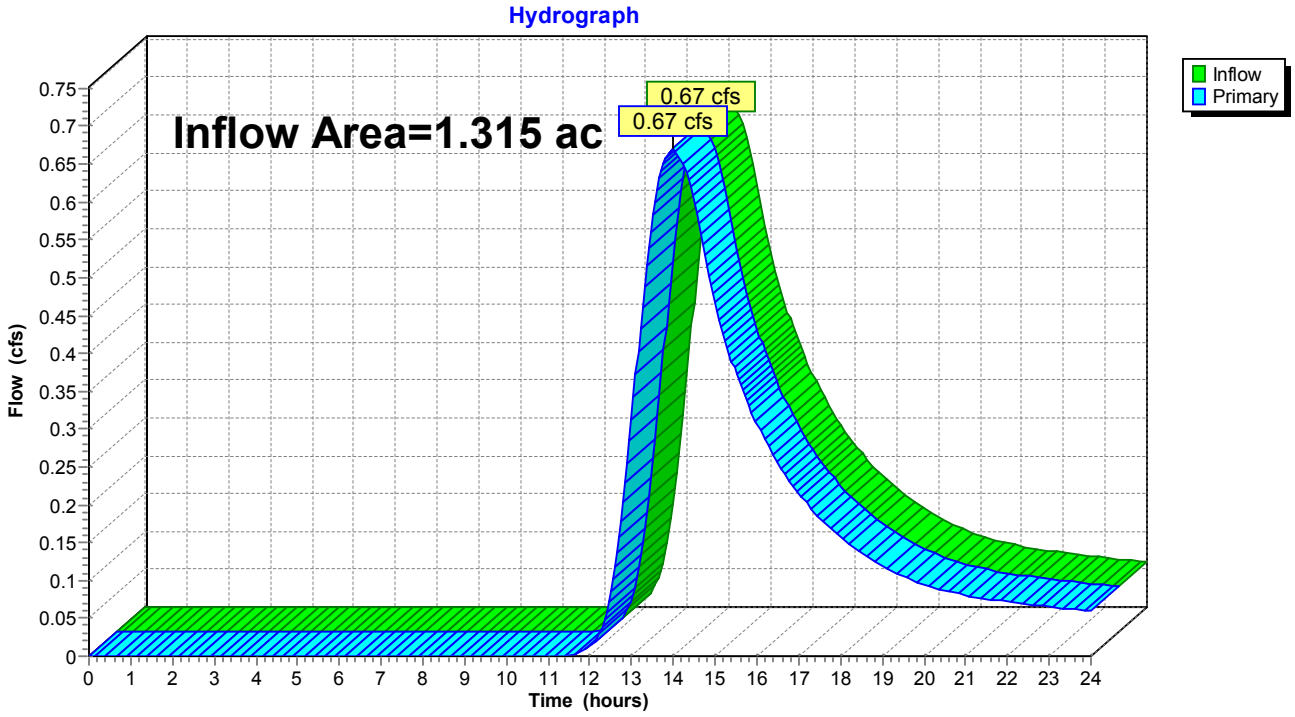


Summary for Pond W 3: Existing Wetland Area 3

Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth > 1.97" for 25 year storm event
Inflow = 0.67 cfs @ 13.97 hrs, Volume= 0.216 af
Primary = 0.67 cfs @ 13.97 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 3: Existing Wetland Area 3

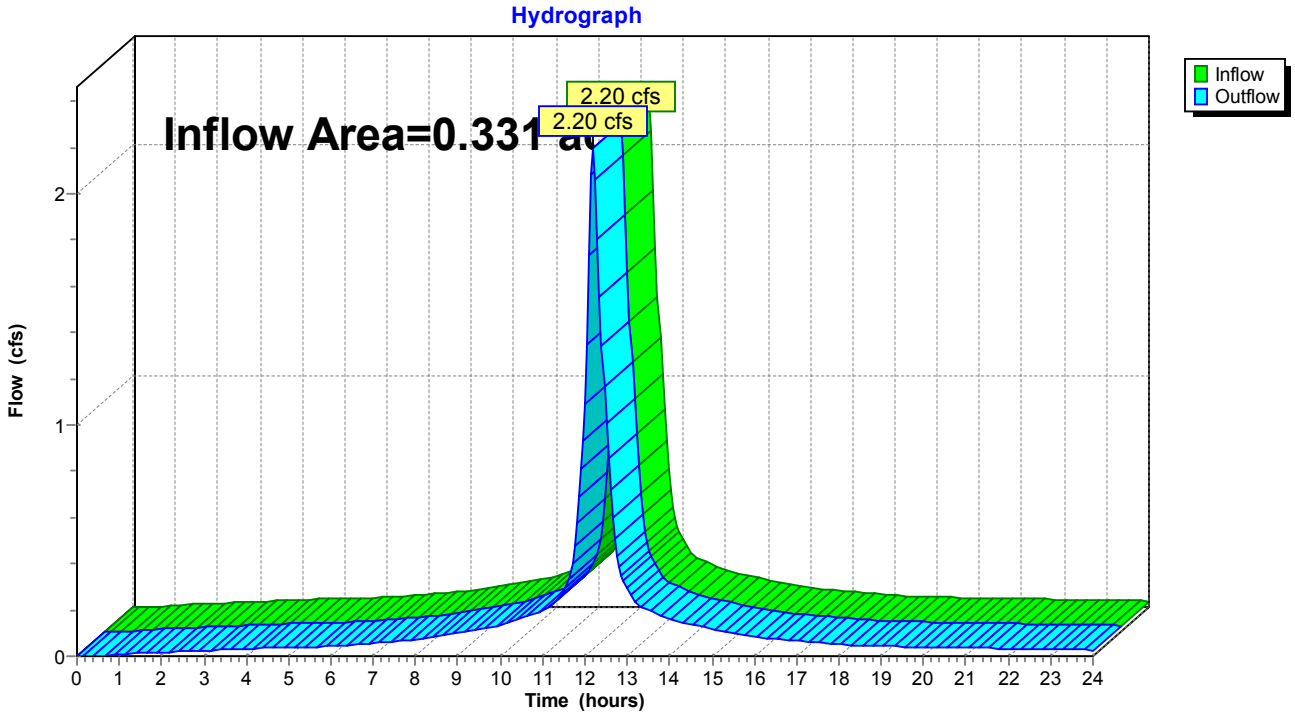


Summary for Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af
Outflow = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" HDPE: Roofdrains HDPE collection pipe from 1/2 roof into Existing Retention Basin

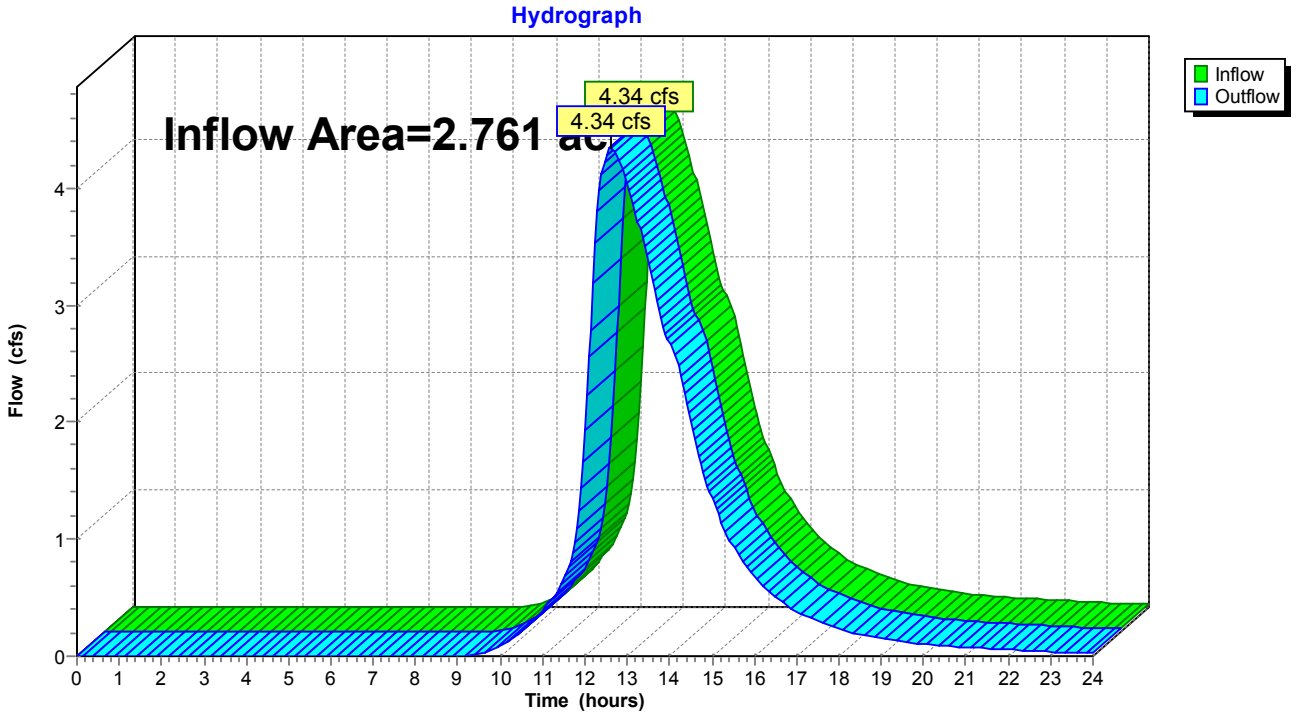


Summary for Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 4.51" for 100 year storm event
Inflow = 4.34 cfs @ 12.62 hrs, Volume= 1.037 af
Outflow = 4.34 cfs @ 12.62 hrs, Volume= 1.037 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" RCP: Pass-thru RCP pipe from Finger Swale overflow into Existing Retention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

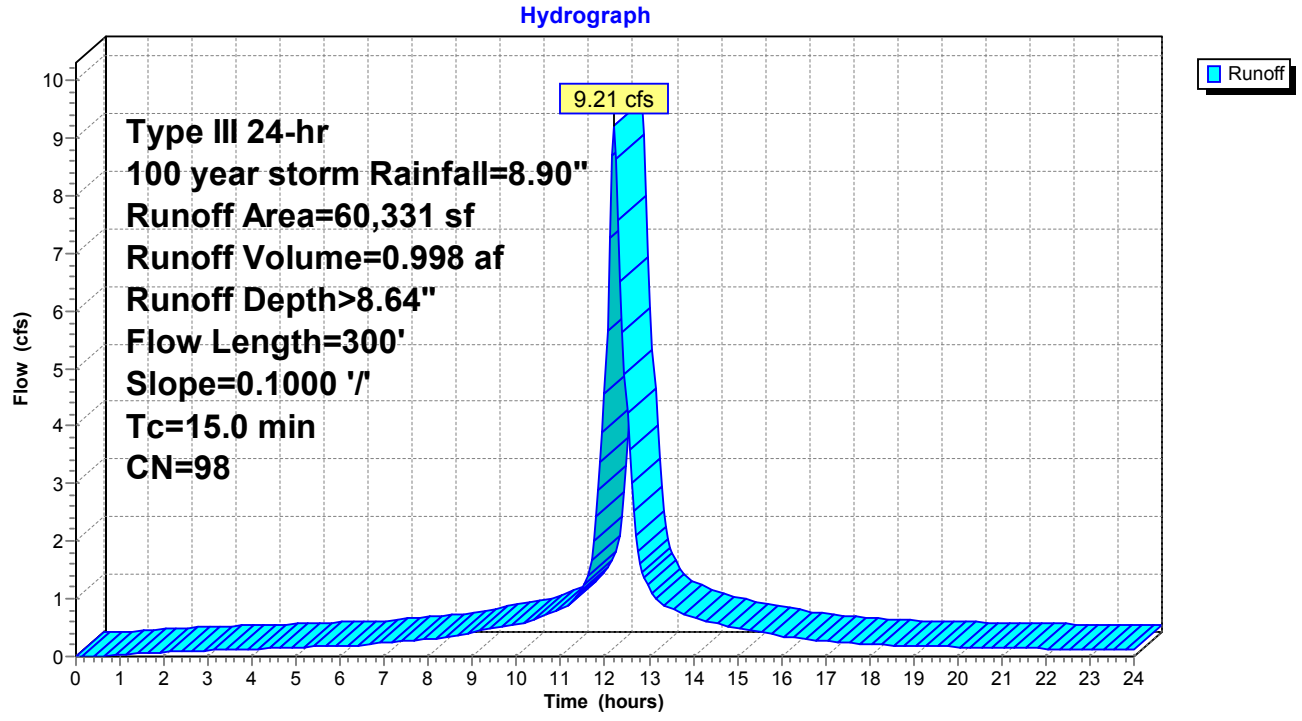
Runoff = 9.21 cfs @ 12.20 hrs, Volume= 0.998 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
60,331	98	Roofs, HSG A
60,331		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale


Hydrograph
Runoff
9.21 cfs
Type III 24-hr
100 year storm Rainfall=8.90"
Runoff Area=60,331 sf
Runoff Volume=0.998 af
Runoff Depth>8.64"
Flow Length=300'
Slope=0.1000 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

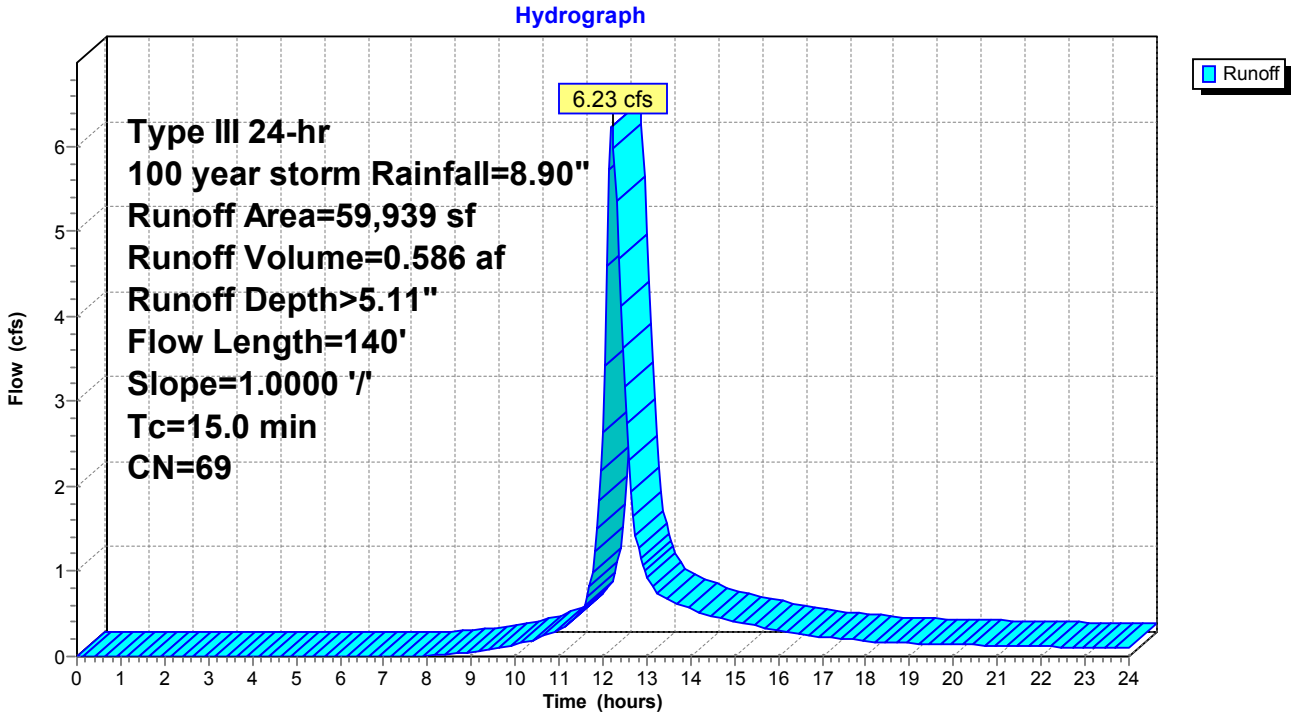
Runoff = 6.23 cfs @ 12.21 hrs, Volume= 0.586 af, Depth> 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
59,939	69	50-75% Grass cover, Fair, HSG B
59,939		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

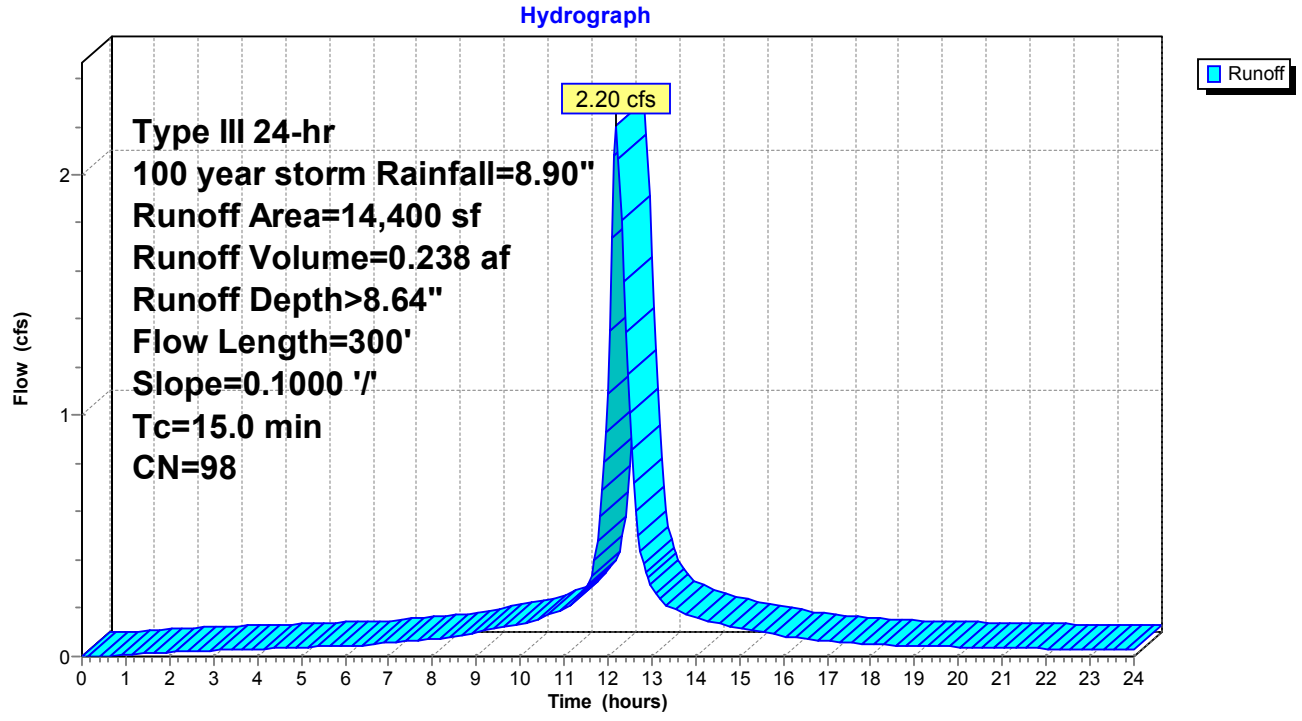
Runoff = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland

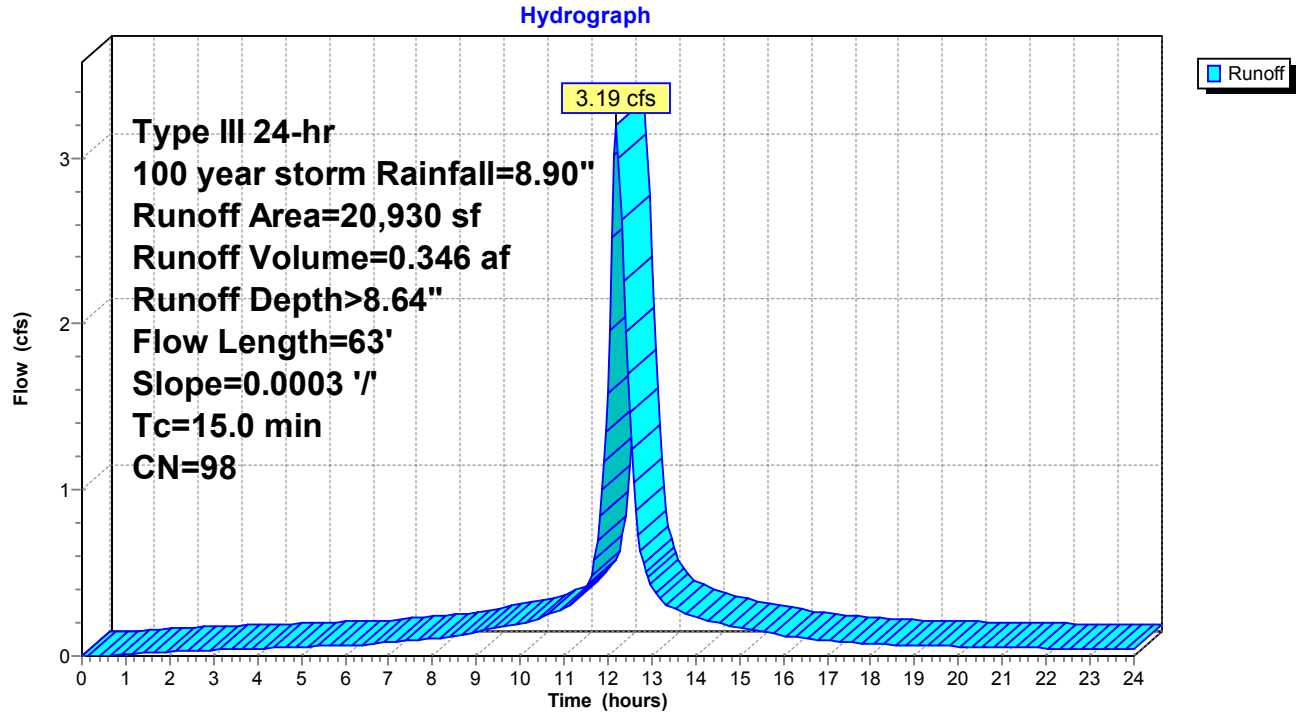
Runoff = 3.19 cfs @ 12.20 hrs, Volume= 0.346 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E4 IMPV: Existing impervious ground surface flowing toward adjacent wetland



ummary for Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Bas

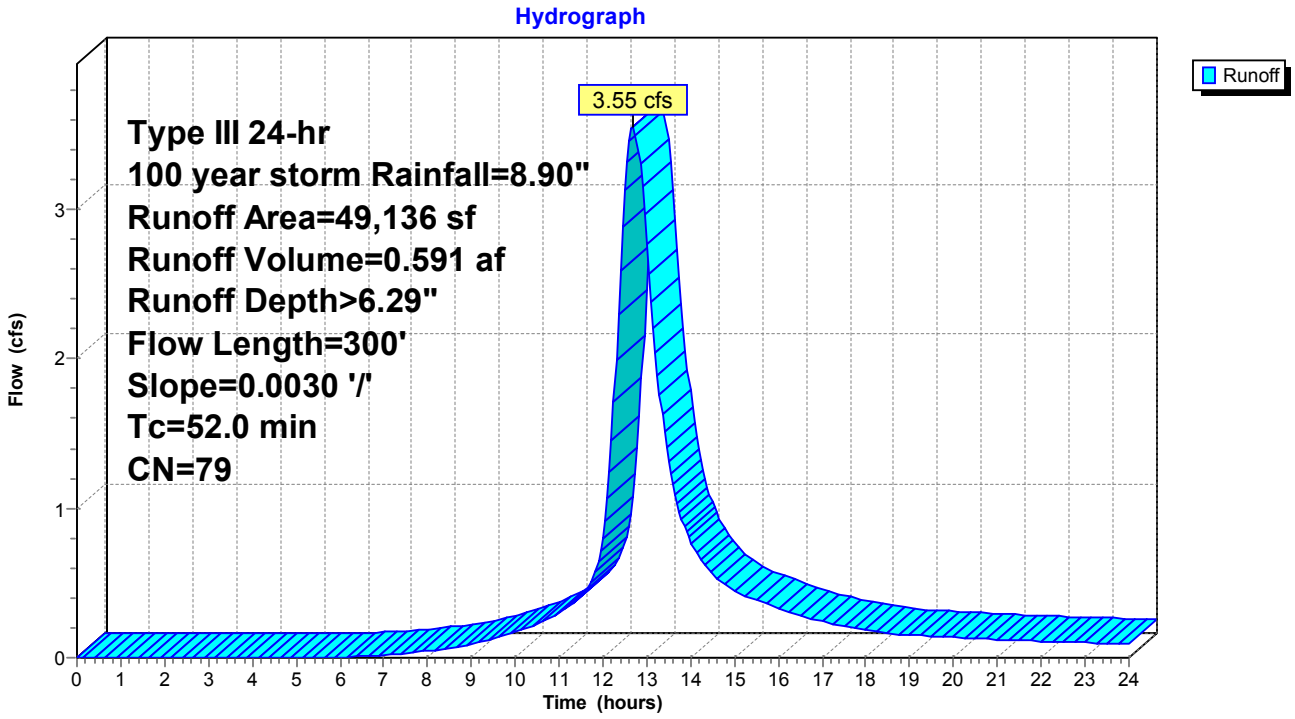
Runoff = 3.55 cfs @ 12.69 hrs, Volume= 0.591 af, Depth> 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
49,136	79	<50% Grass cover, Poor, HSG B
49,136		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.0	300	0.0030	0.10		**Sheet Flow, overland runoff toward basin** Grass: Short n= 0.150 P2= 3.00"

Subcatchment E4-PERV: Existing pervious ground surface area E4 around Existing Retention Basin



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.16% Impervious, Inflow Depth > 6.88" for 100 year storm event
Inflow = 15.43 cfs @ 12.20 hrs, Volume= 1.584 af
Outflow = 5.00 cfs @ 12.62 hrs, Volume= 1.489 af, Atten= 68%, Lag= 25.0 min
Discarded = 0.65 cfs @ 12.62 hrs, Volume= 0.452 af
Secondary = 4.34 cfs @ 12.62 hrs, Volume= 1.037 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.90' @ 12.62 hrs Surf.Area= 0.308 ac Storage= 0.572 af

Plug-Flow detention time= 106.5 min calculated for 1.486 af (94% of inflow)
Center-of-Mass det. time= 73.9 min (851.1 - 777.3)

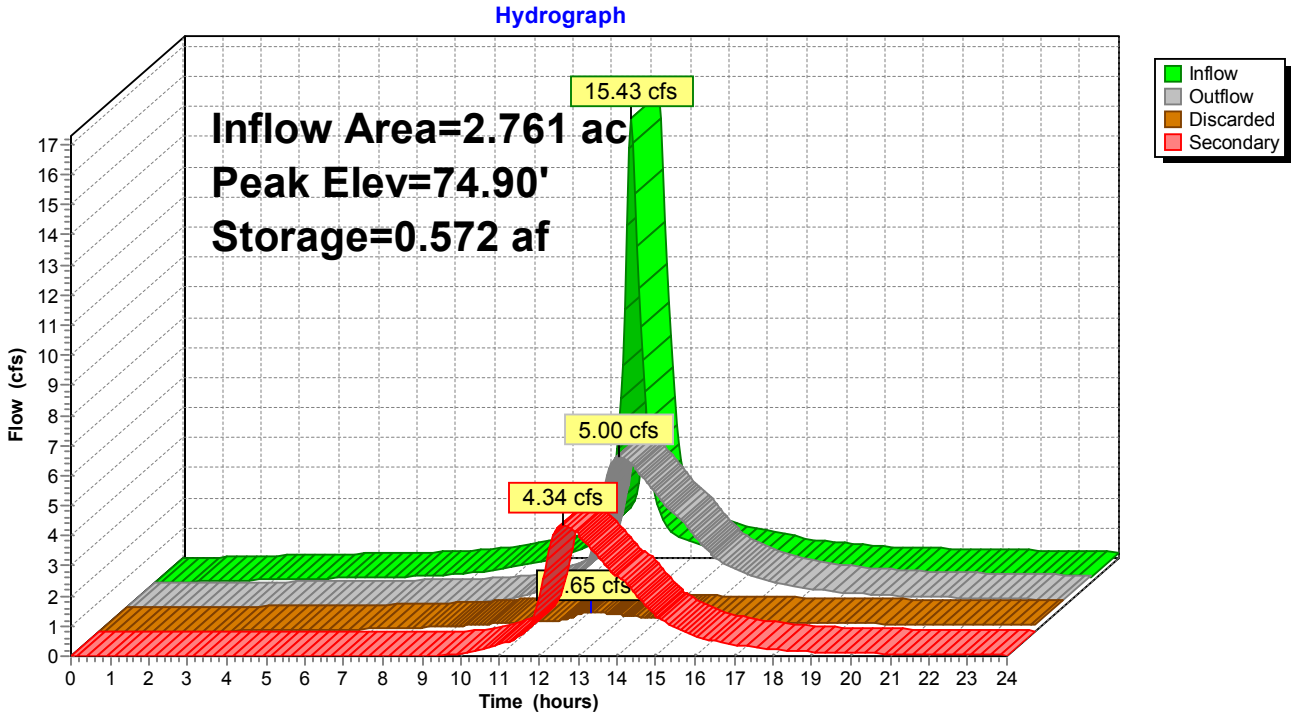
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Discarded	72.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 61.00' Phase-In= 1.00'

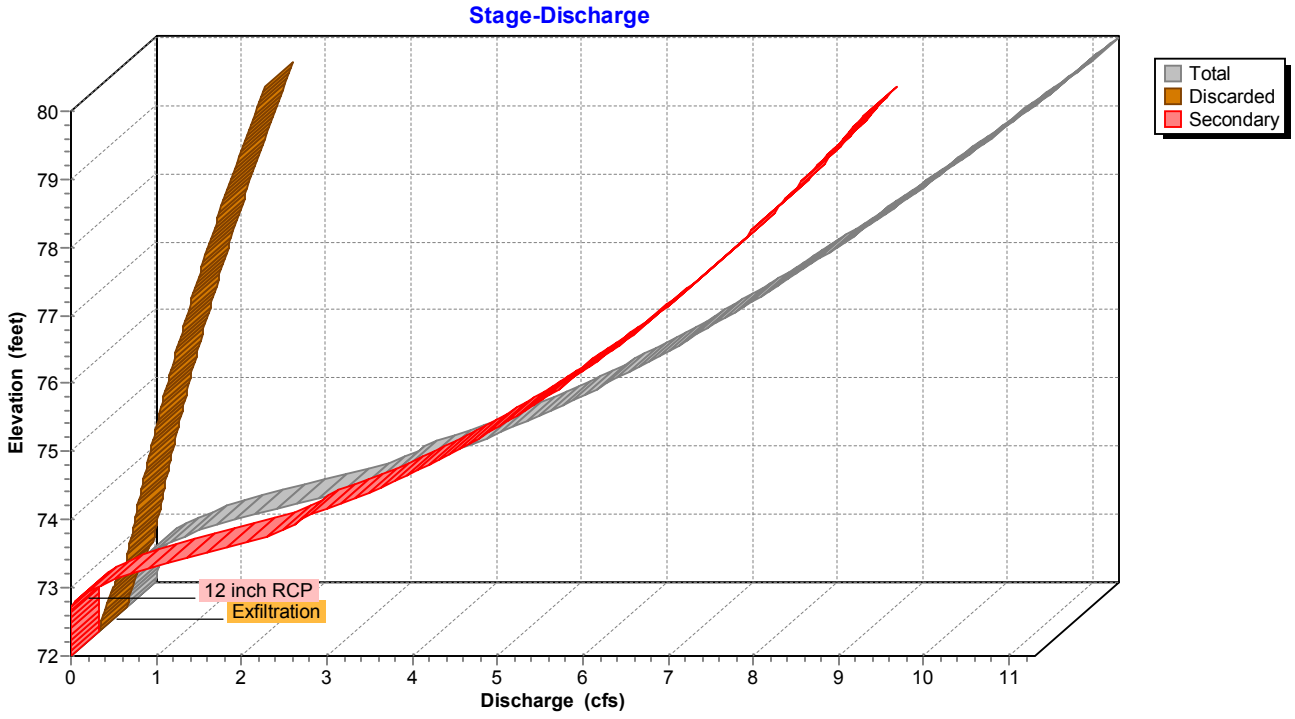
Discarded OutFlow Max=0.65 cfs @ 12.62 hrs HW=74.90' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.65 cfs)

Secondary OutFlow Max=4.34 cfs @ 12.62 hrs HW=74.90' (Free Discharge)
↑—**1=12 inch RCP** (Barrel Controls 4.34 cfs @ 5.53 fps)

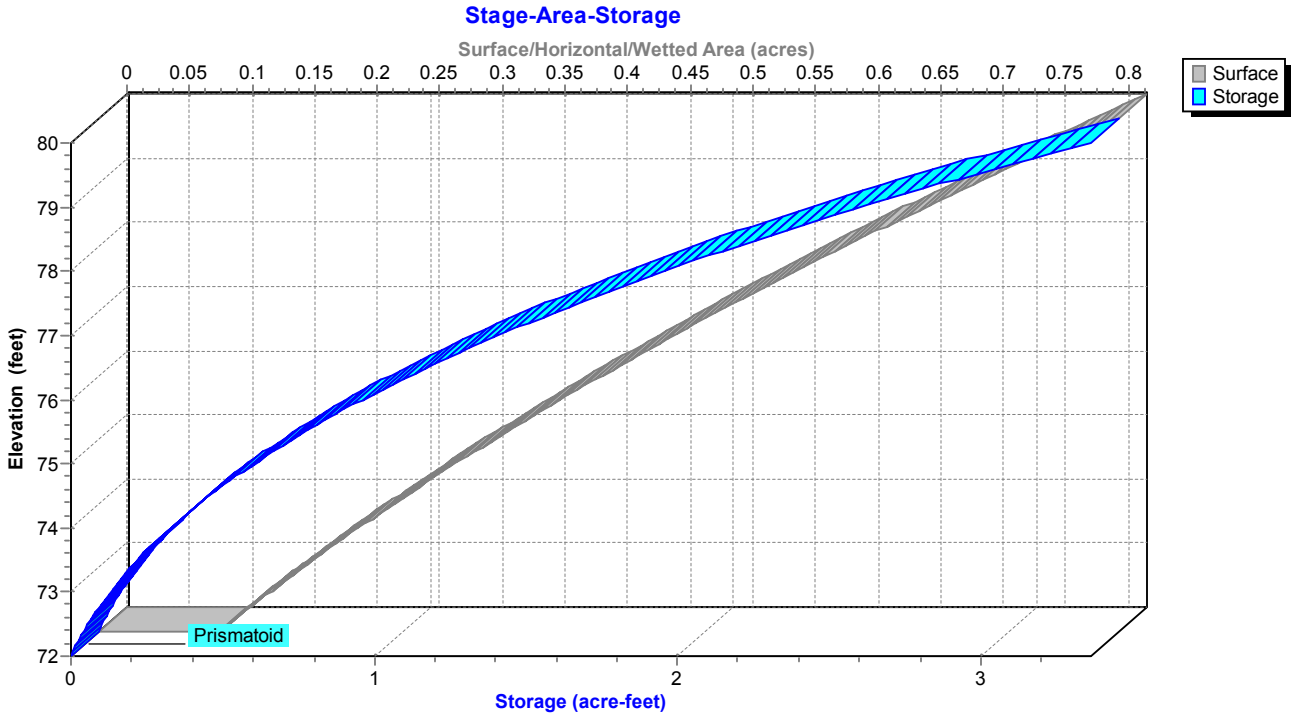
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Summary for Subcatchment Ex G 1: Existing Ground Area 1

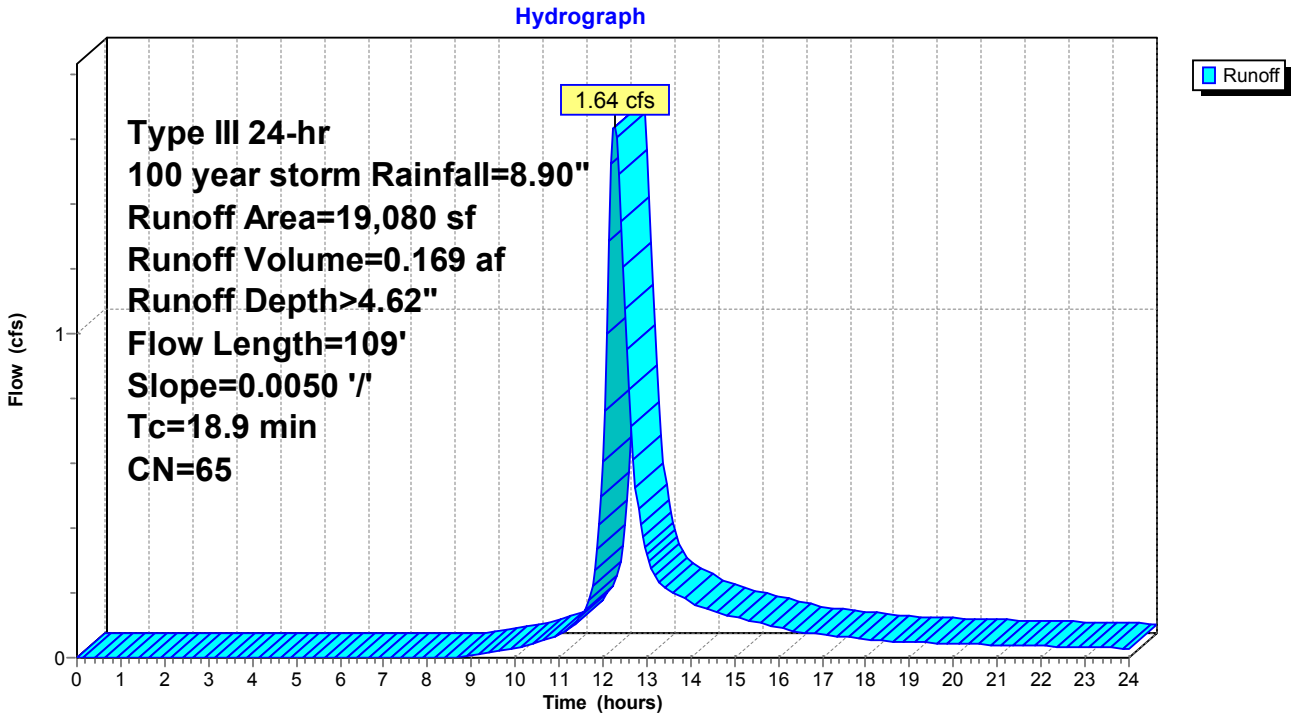
Runoff = 1.64 cfs @ 12.26 hrs, Volume= 0.169 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 1: Existing Ground Area 1



Summary for Subcatchment Ex G 2: Existing Ground Area 2

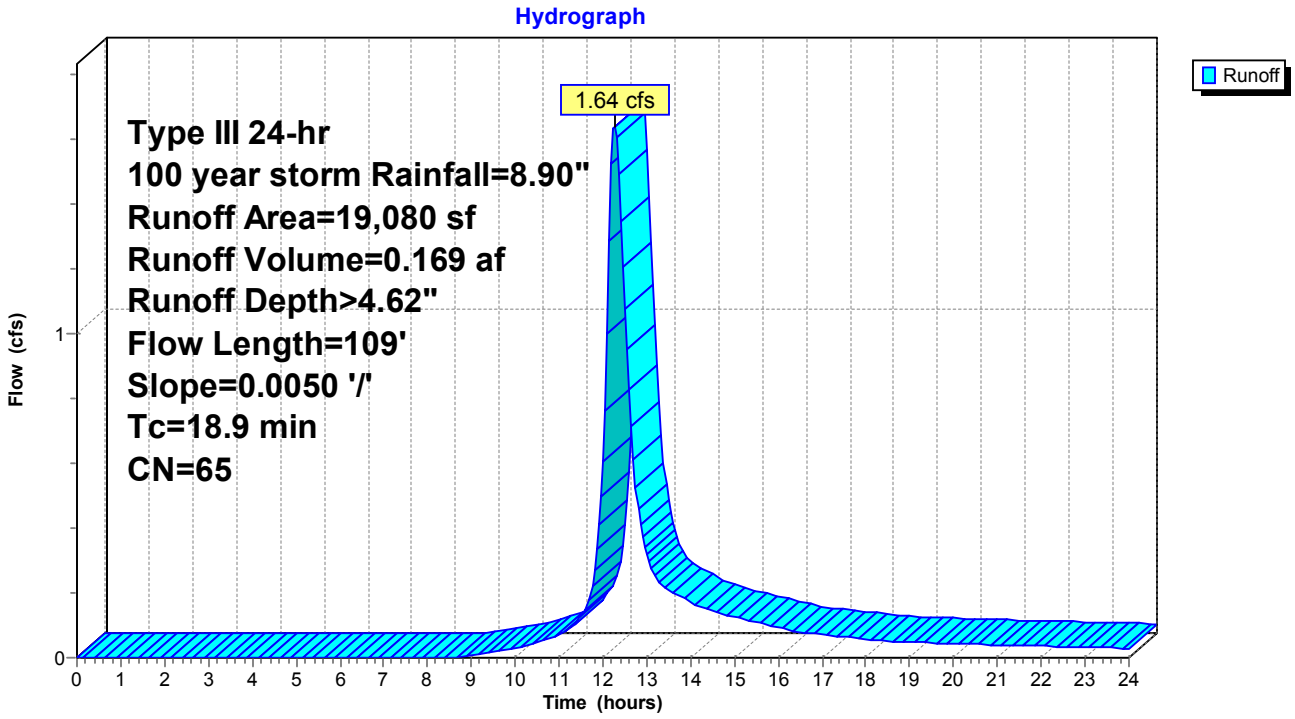
Runoff = 1.64 cfs @ 12.26 hrs, Volume= 0.169 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
19,080	65	Woods/grass comb., Fair, HSG B
19,080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	109	0.0050	0.10		**Sheet Flow, Existing Ground less than 50% grass** Grass: Short n= 0.150 P2= 3.00"

Subcatchment Ex G 2: Existing Ground Area 2



Summary for Subcatchment Ex Trees: Existing Tree Area

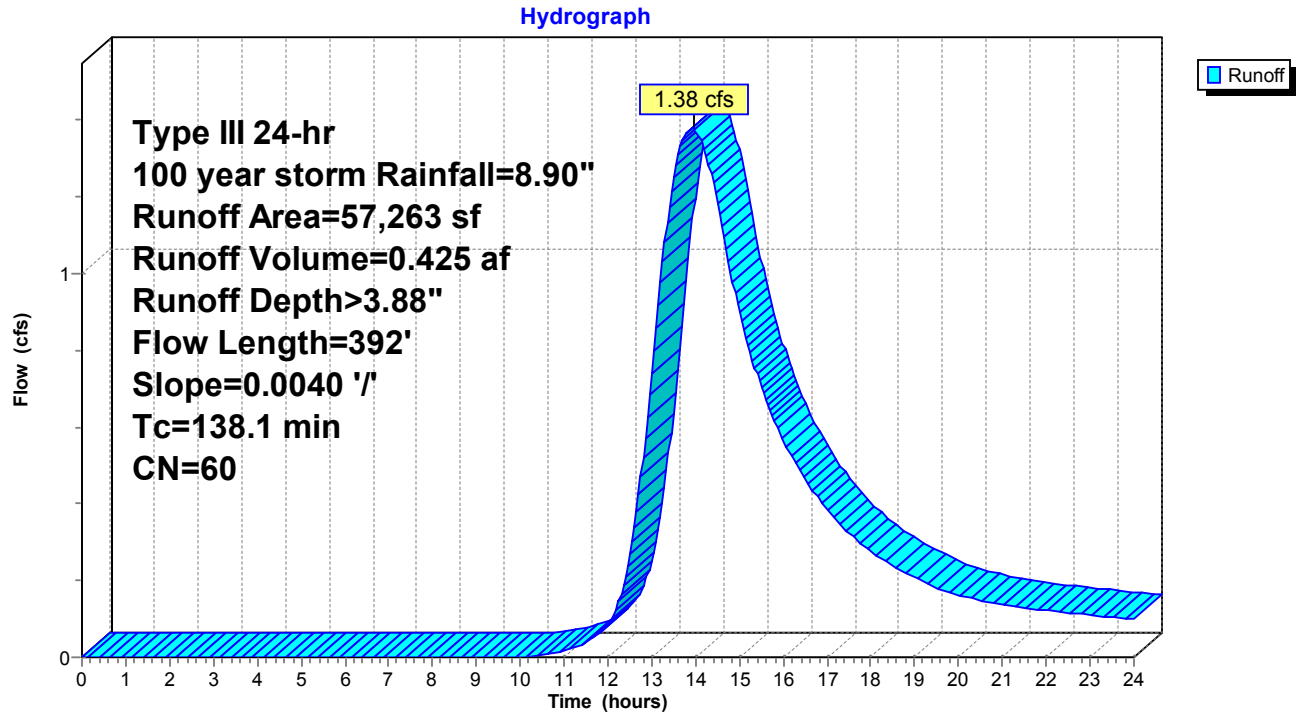
Runoff = 1.38 cfs @ 13.94 hrs, Volume= 0.425 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
57,263	60	Woods, Fair, HSG B
57,263		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
128.0	200	0.0040	0.03		**Sheet Flow, Natural Tree Area** Woods: Dense underbrush n= 0.800 P2= 3.00"
10.1	192	0.0040	0.32		**Shallow Concentrated Flow, Natural Tree Area** Woodland Kv= 5.0 fps
138.1	392	Total			

Subcatchment Ex Trees: Existing Tree Area



Summary for Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

Inflow Area = 4.220 ac, 40.66% Impervious, Inflow Depth > 5.31" for 100 year storm event
Inflow = 8.52 cfs @ 12.59 hrs, Volume= 1.867 af
Outflow = 8.00 cfs @ 12.50 hrs, Volume= 1.866 af, Atten= 6%, Lag= 0.0 min
Discarded = 8.00 cfs @ 12.50 hrs, Volume= 1.866 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.24' @ 12.82 hrs Surf.Area= 0.048 ac Storage= 0.046 af

Plug-Flow detention time= 3.0 min calculated for 1.866 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (824.6 - 821.8)

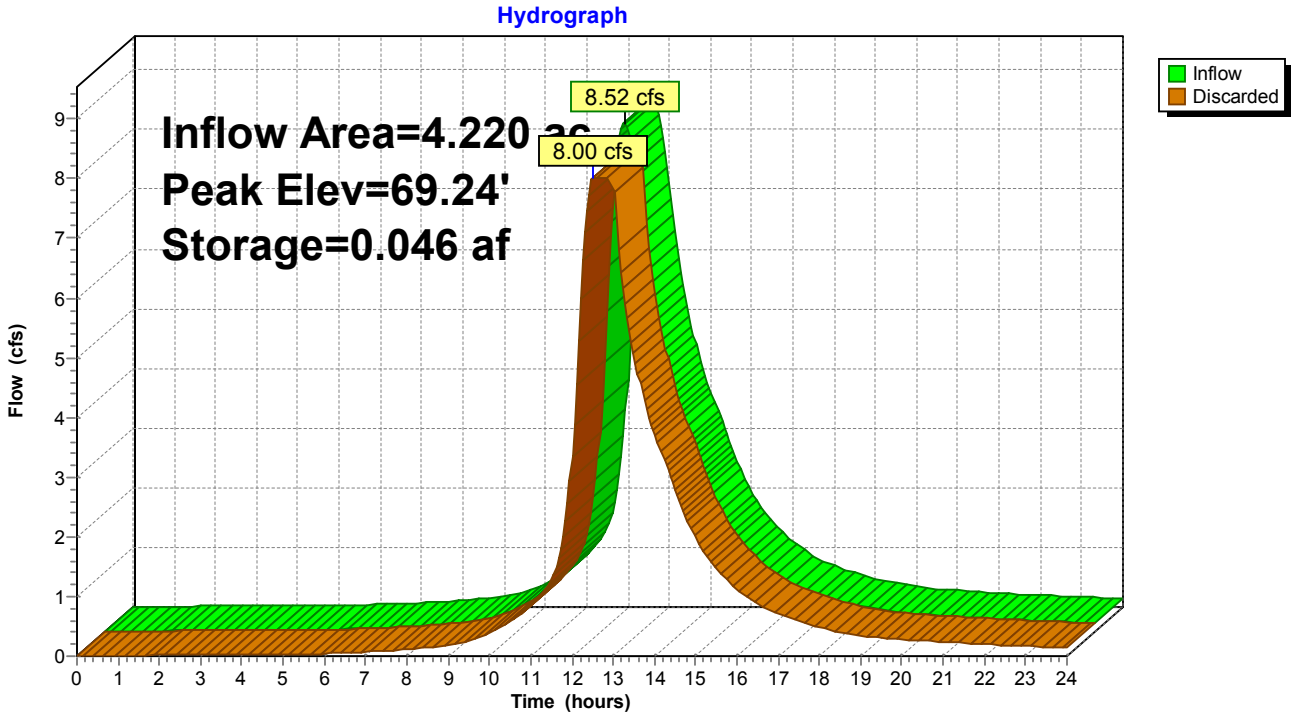
Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	0.569 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
68.00	0.028	0.000	0.000
69.00	0.043	0.036	0.036
70.00	0.063	0.053	0.089
71.00	0.091	0.077	0.166
72.00	0.121	0.106	0.272
73.00	0.148	0.134	0.406
74.00	0.179	0.163	0.569

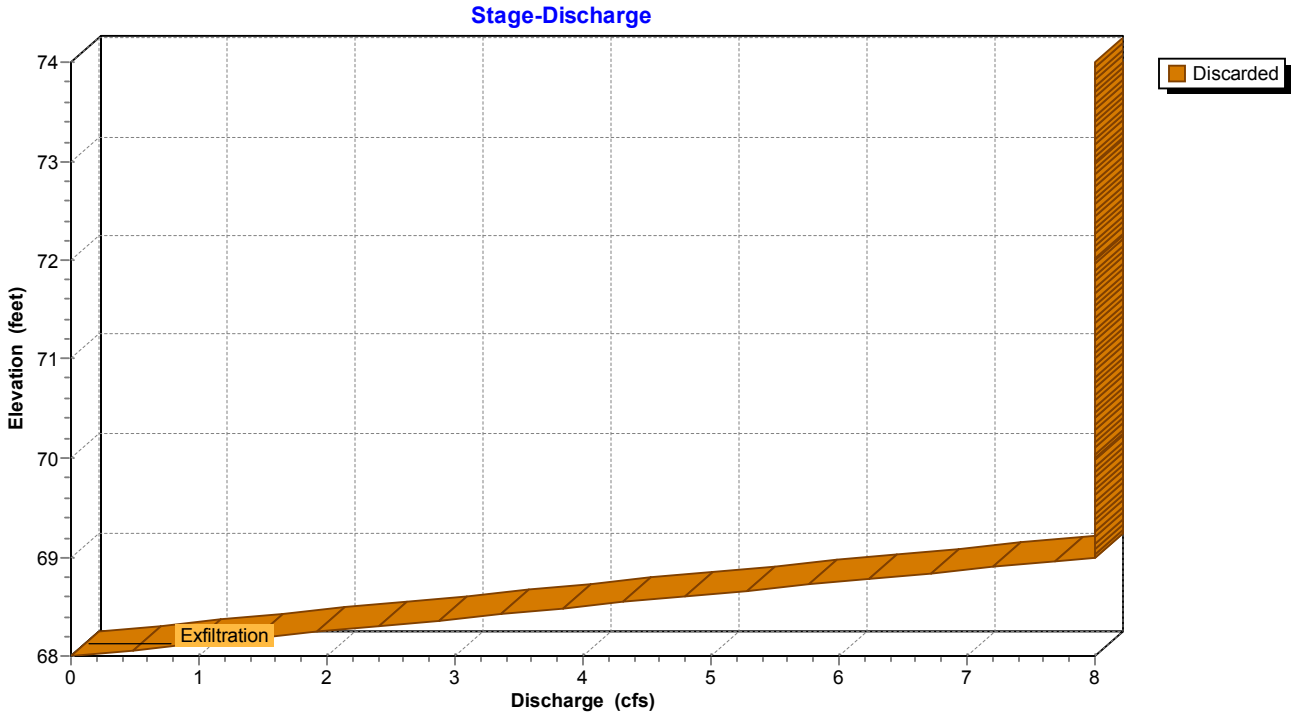
Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.00 cfs Exfiltration at all elevations** Phase-In= 1.00'

Discarded OutFlow Max=8.00 cfs @ 12.50 hrs HW=69.03' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 8.00 cfs)

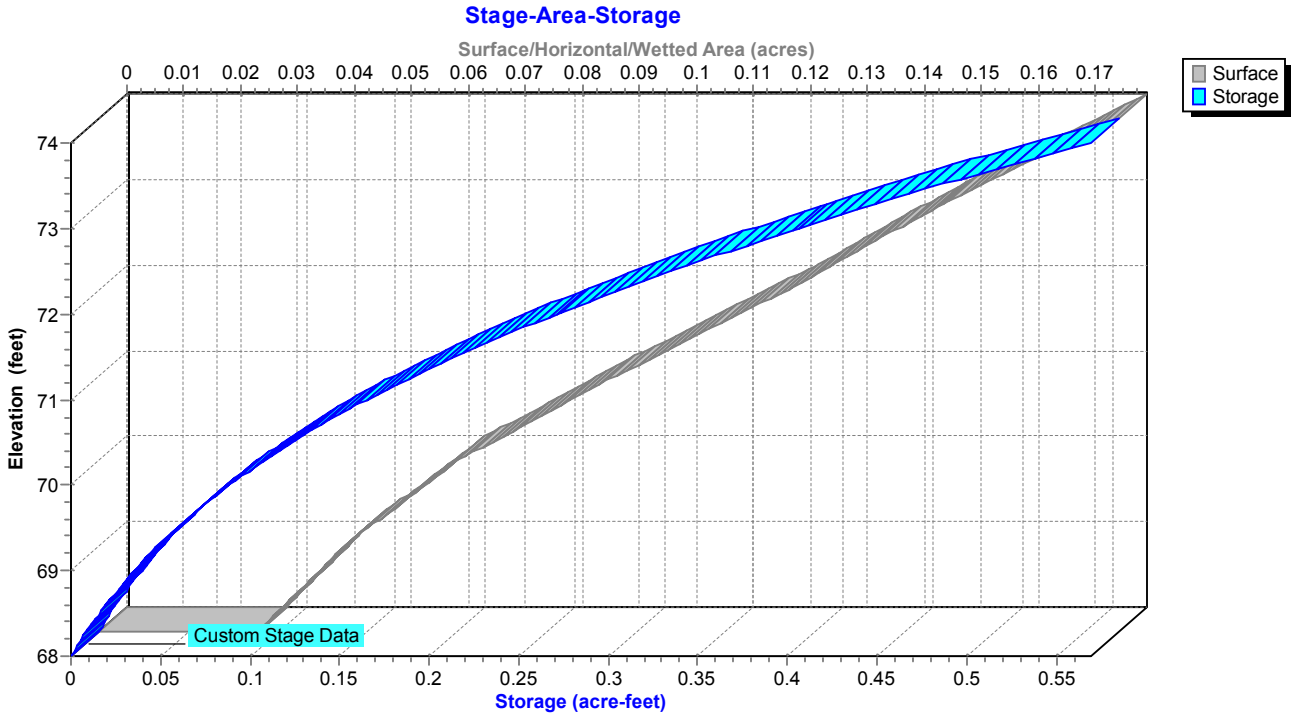
Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin



Pond EX-RRB: Design Point of Analysis #2 Existing Retention Recharge Basin

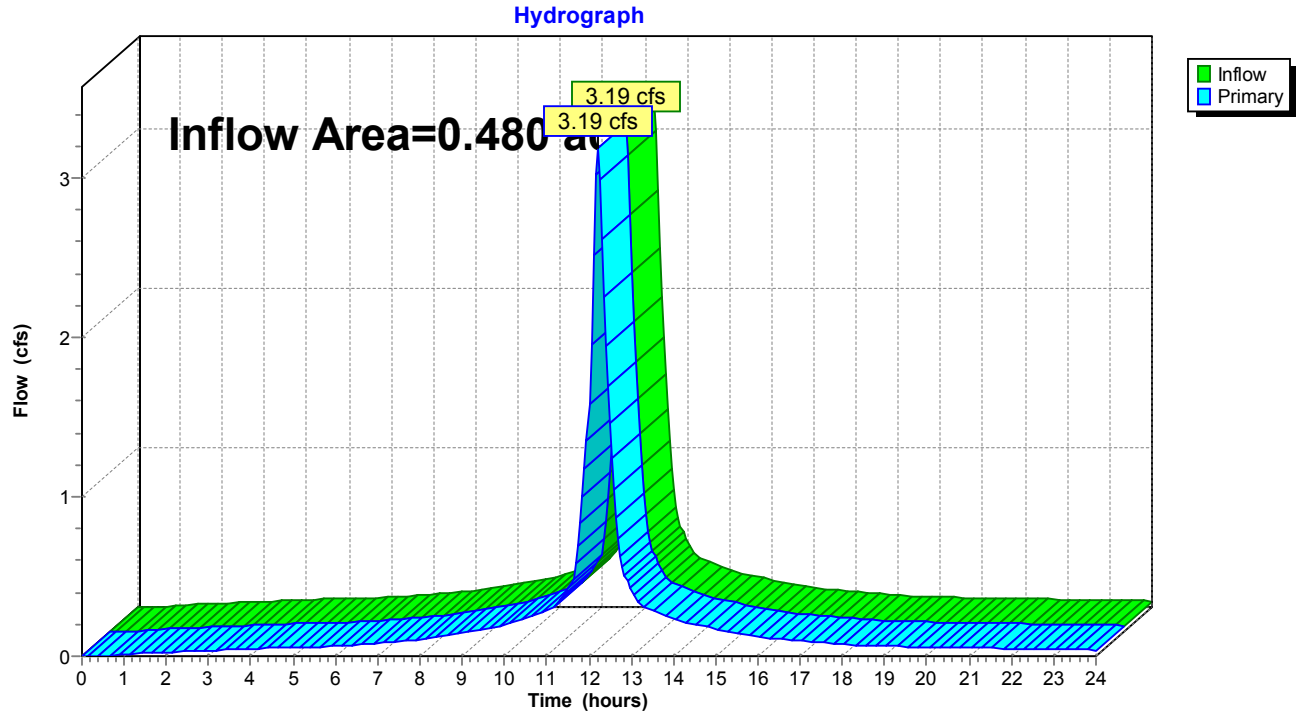


Summary for Pond W 1: Existing Wetland Area 1

Inflow Area = 0.480 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 3.19 cfs @ 12.20 hrs, Volume= 0.346 af
Primary = 3.19 cfs @ 12.20 hrs, Volume= 0.346 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 1: Existing Wetland Area 1

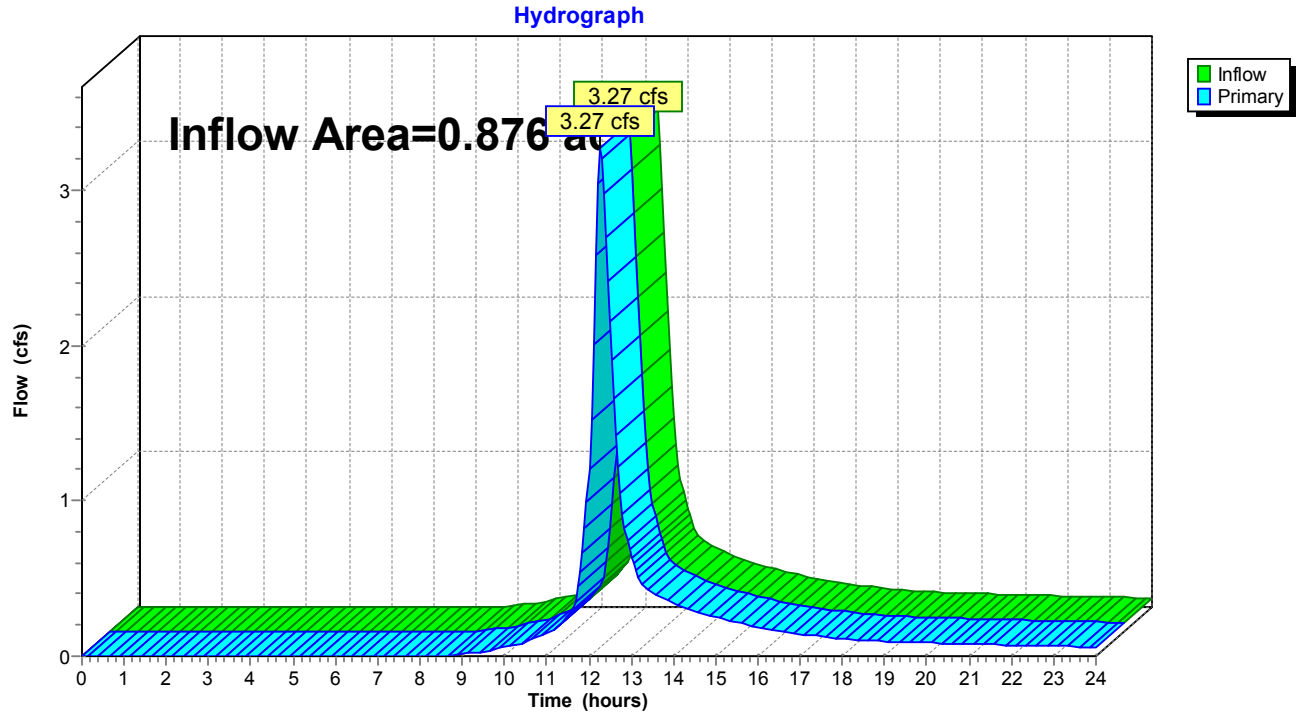


Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.876 ac, 0.00% Impervious, Inflow Depth > 4.62" for 100 year storm event
Inflow = 3.27 cfs @ 12.26 hrs, Volume= 0.337 af
Primary = 3.27 cfs @ 12.26 hrs, Volume= 0.337 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2

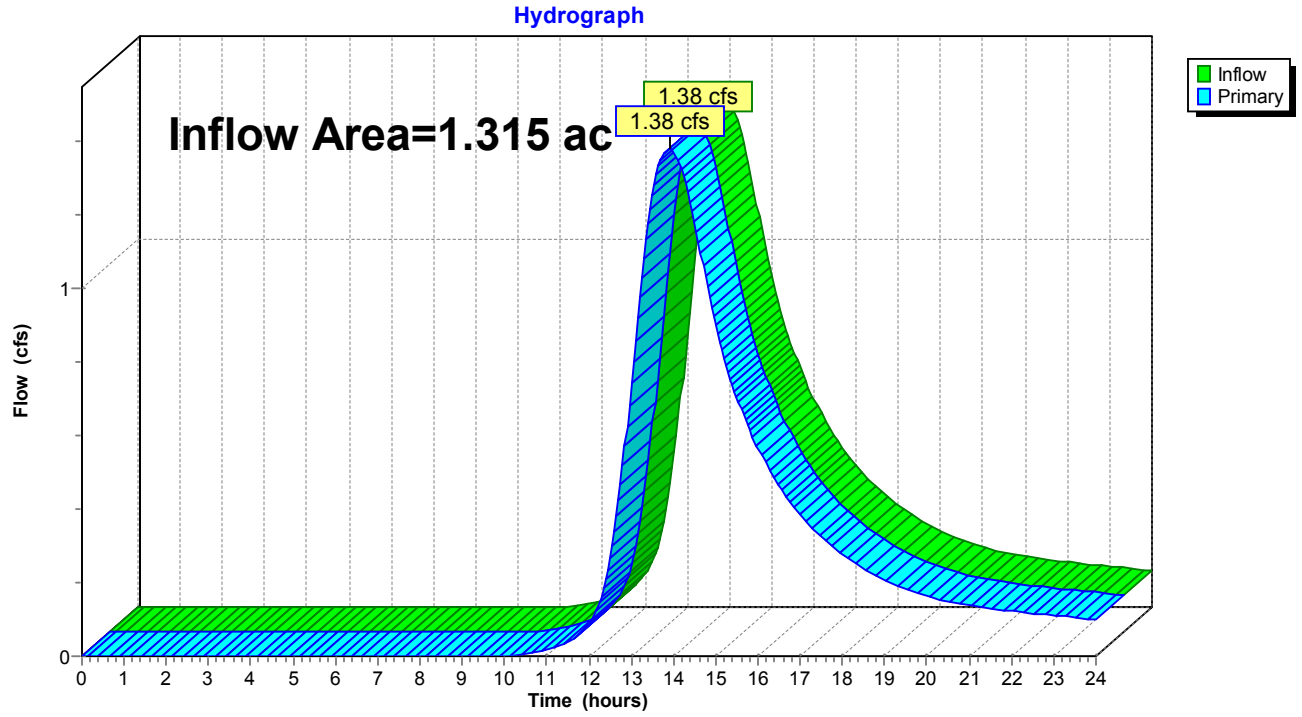


Summary for Pond W 3: Existing Wetland Area 3

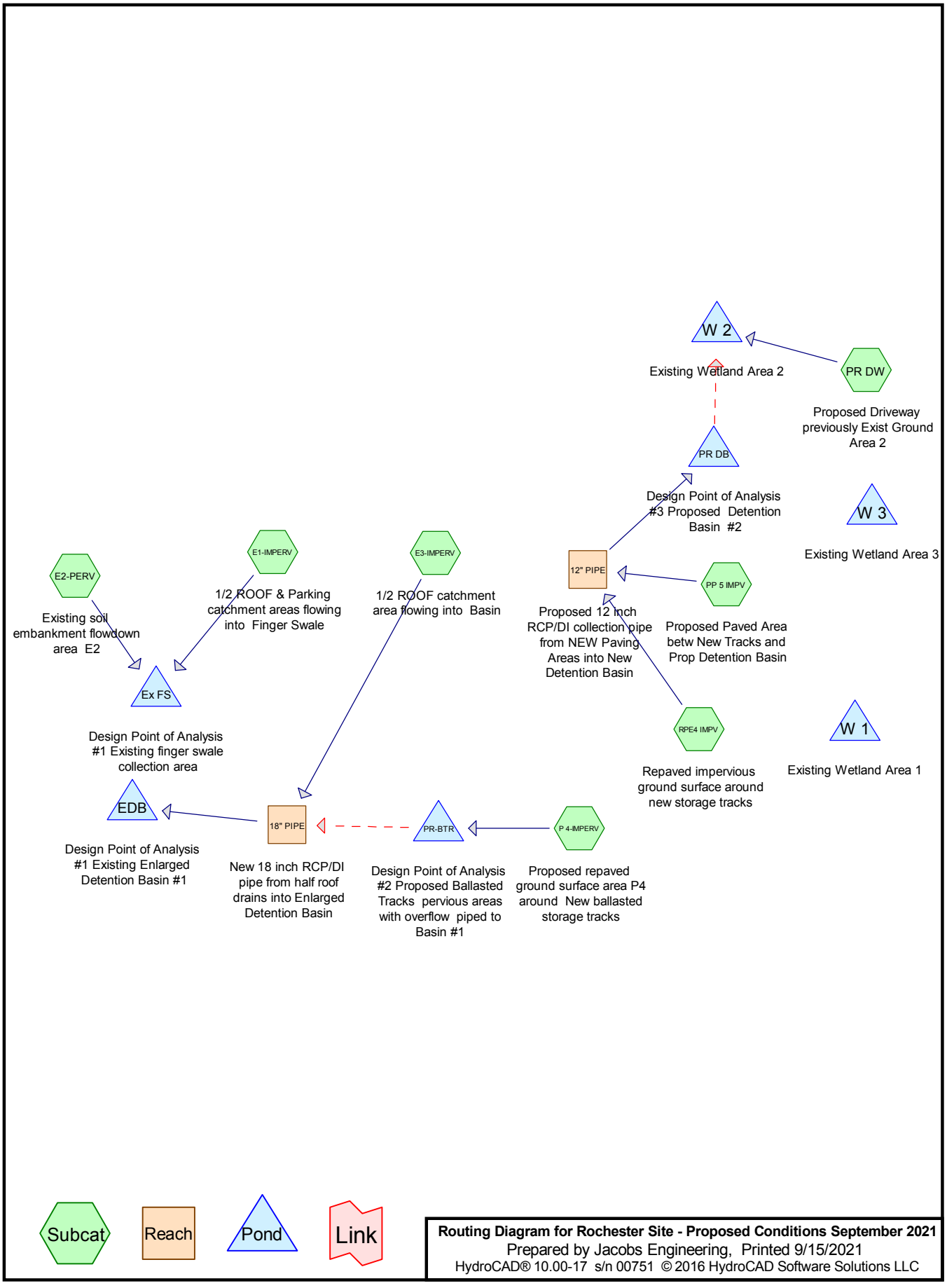
Inflow Area = 1.315 ac, 0.00% Impervious, Inflow Depth > 3.88" for 100 year storm event
Inflow = 1.38 cfs @ 13.94 hrs, Volume= 0.425 af
Primary = 1.38 cfs @ 13.94 hrs, Volume= 0.425 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 3: Existing Wetland Area 3



PROPOSED CONDITIONS


W 2
Existing Wetland Area 2
PR DW
Proposed Driveway previously Exist Ground Area 2
PR DB
Design Point of Analysis #3 Proposed Detention Basin #2
W 3
Existing Wetland Area 3
E1-IMPERV
E3-IMPERV
12" PIPE
E2-PERV
PP 5 IMPV
1/2 ROOF & Parking catchment areas flowing into Finger Swale
1/2 ROOF catchment area flowing into Basin
Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention Basin
Proposed Paved Area betw New Tracks and Prop Detention Basin
Existing soil embankment flowdown area E2
Ex FS
RPE4 IMPV
W 1
Existing Wetland Area 1
Design Point of Analysis #1 Existing finger swale collection area
Repaved impervious ground surface around new storage tracks
EDB
18" PIPE
PR-BTR
P 4-IMPERV
Design Point of Analysis #1 Existing Enlarged Detention Basin #1
New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin
Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Basin #1
Proposed repaved ground surface area P4 around New ballasted storage tracks
Subcat
Reach
Pond
Link

Routing Diagram for Rochester Site - Proposed Conditions September 2021
Prepared by Jacobs Engineering, Printed 9/15/2021
HydroCAD® 10.00-17 s/n 00751 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.359	69	50-75% Grass cover, Fair, HSG B (E2-PERV)
0.160	98	Paved parking, HSG A (PR DW)
1.664	98	Paved roads w/curbs & sewers, HSG A (P 4-IMPERV, PP 5 IMPV)
1.733	98	Roofs, HSG A (E1-IMPERV, E3-IMPERV)
0.480	98	Unconnected pavement, HSG C (RPE4 IMPV)
5.397	**91**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.557	HSG A	E1-IMPERV, E3-IMPERV, P 4-IMPERV, PP 5 IMPV, PR DW
1.359	HSG B	E2-PERV
0.480	HSG C	RPE4 IMPV
0.000	HSG D	
0.000	Other	
5.397		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.359	0.000	0.000	0.000	1.359	50-75% Grass cover, Fair	E2-PERV
0.160	0.000	0.000	0.000	0.000	0.160	Paved parking	PR DW
1.664	0.000	0.000	0.000	0.000	1.664	Paved roads w/curbs & sewers	P 4-IMPERV, PP 5 IMPV
1.733	0.000	0.000	0.000	0.000	1.733	Roofs	E1-IMPERV, E3-IMPERV
0.000	0.000	0.480	0.000	0.000	0.480	Unconnected pavement	RPE4 IMPV
3.557	**1.359**	**0.480**	**0.000**	**0.000**	**5.397**	**TOTAL AREA**	

Pipe Listing (all nodes)

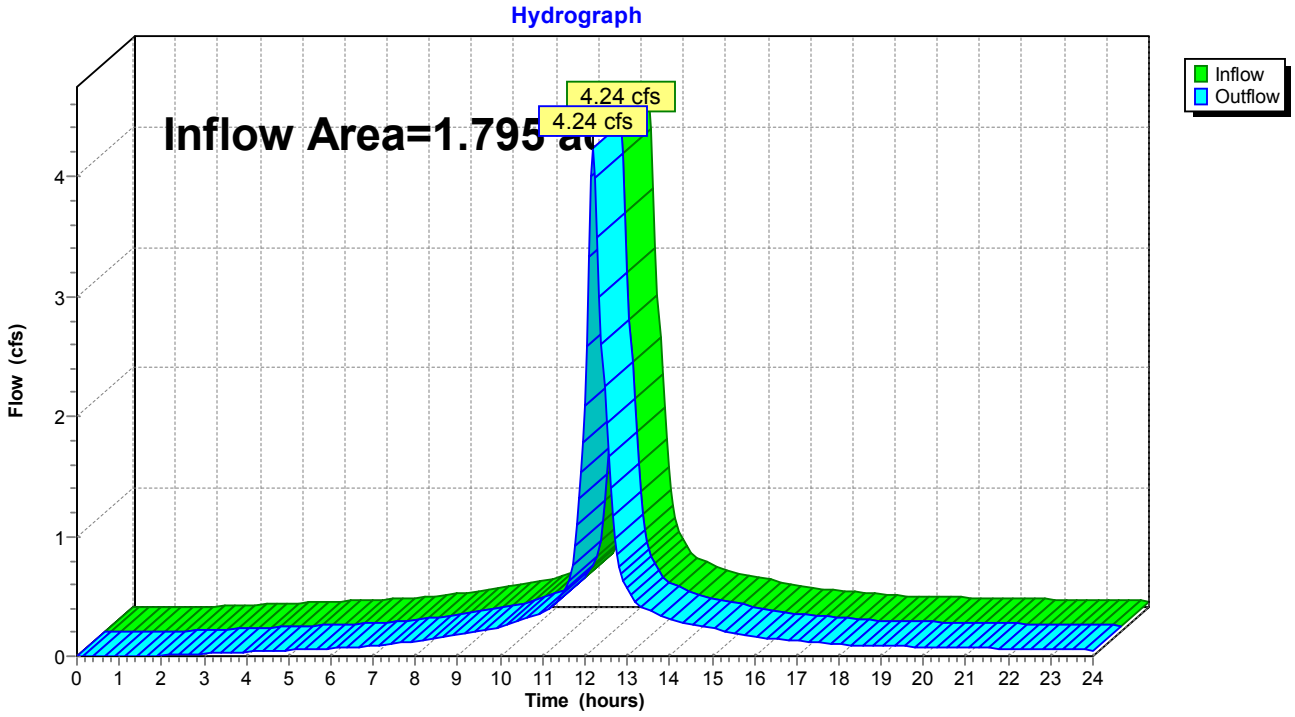
Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	Ex FS	72.68	72.49	65.0	0.0029	0.011	12.0	0.0	0.0
2	PR-BTR	73.50	73.20	100.0	0.0030	0.014	18.0	0.0	0.0

...ary for Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 4.24 cfs @ 12.20 hrs, Volume= 0.443 af
Outflow = 4.24 cfs @ 12.20 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention Basin

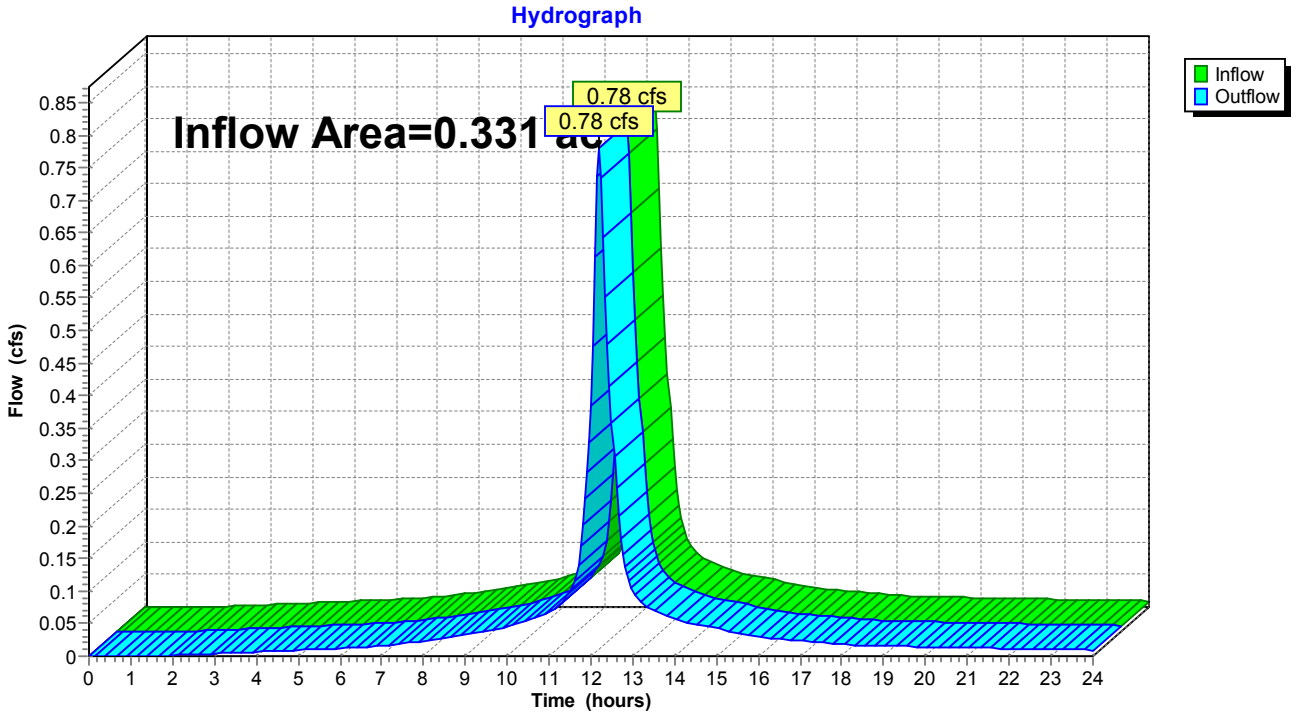


Summary for Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af
Outflow = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

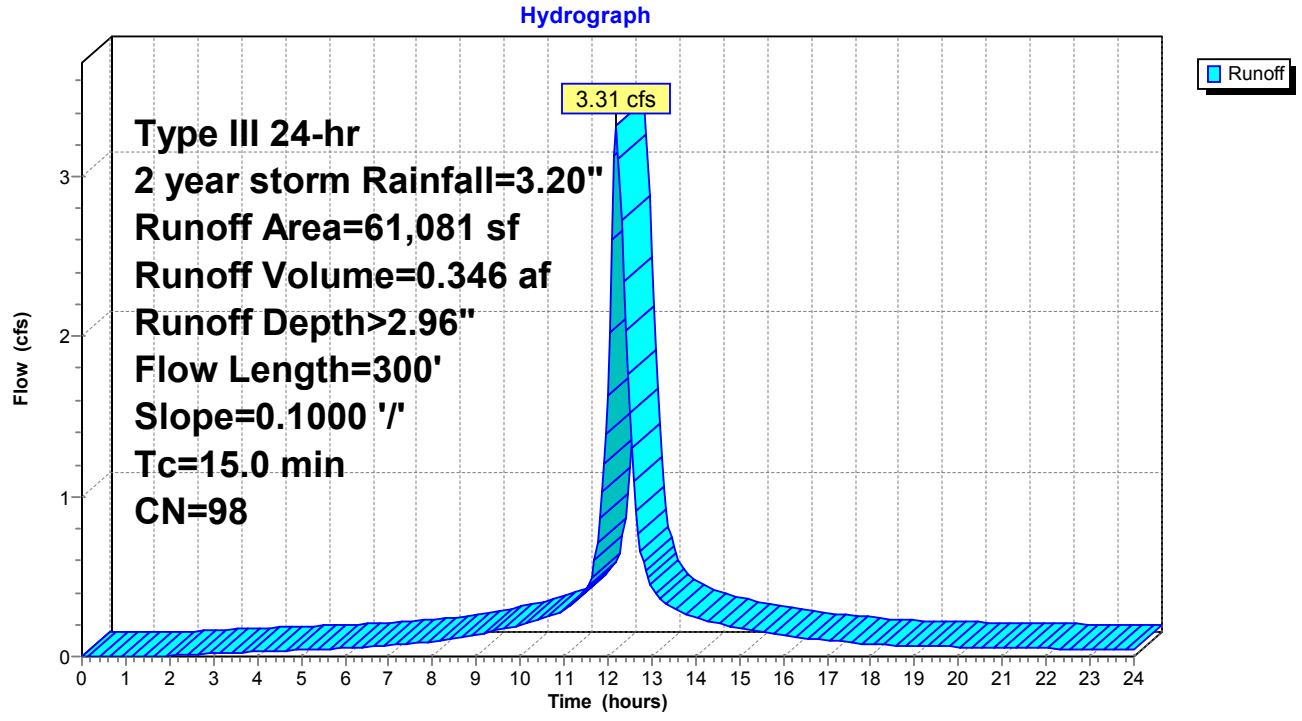
Runoff = 3.31 cfs @ 12.20 hrs, Volume= 0.346 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
61,081	98	Roofs, HSG A
61,081		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

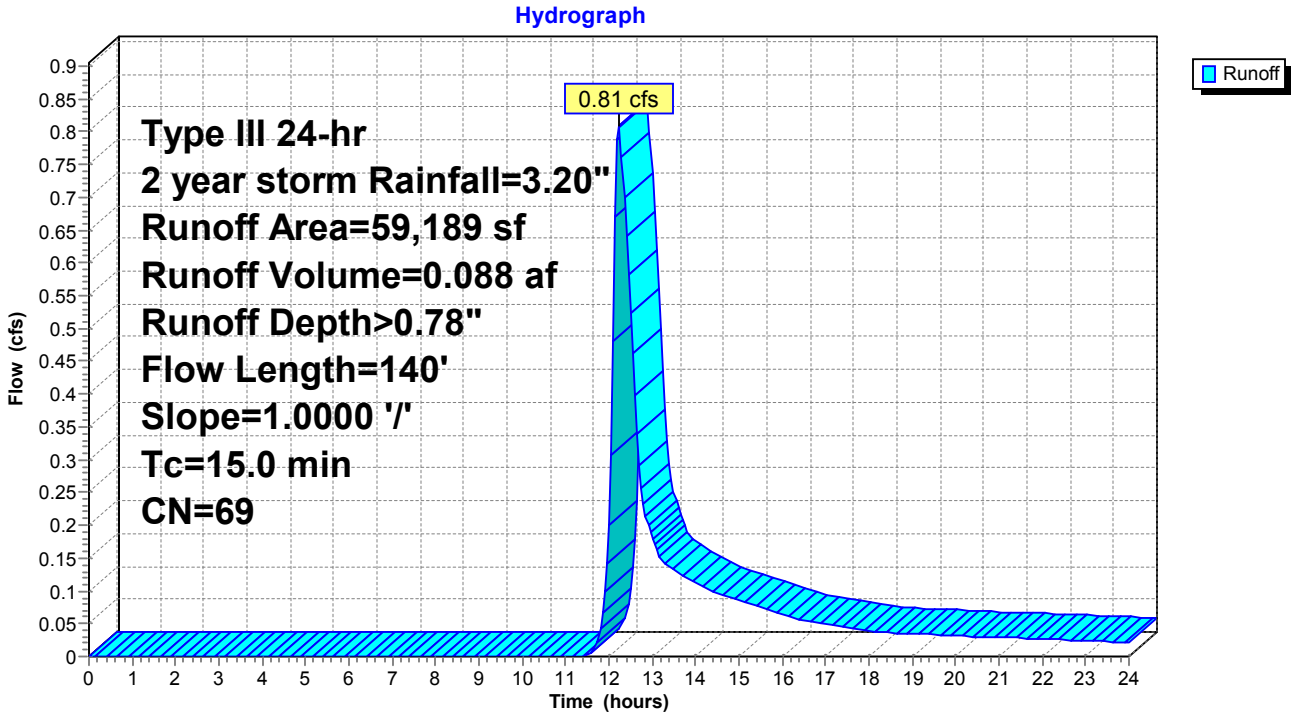
Runoff = 0.81 cfs @ 12.24 hrs, Volume= 0.088 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
59,189	69	50-75% Grass cover, Fair, HSG B
59,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

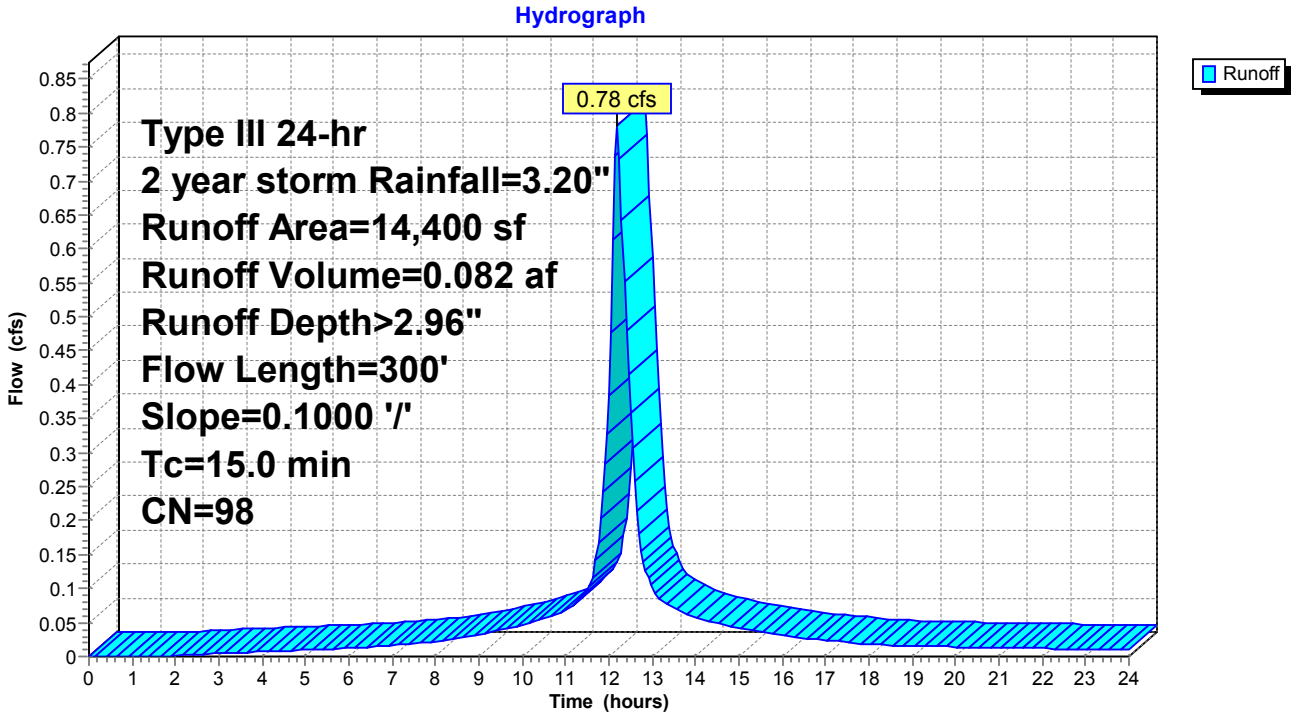
Runoff = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin


Hydrograph
Runoff
0.78 cfs
Type III 24-hr
2 year storm Rainfall=3.20"
Runoff Area=14,400 sf
Runoff Volume=0.082 af
Runoff Depth>2.96"
Flow Length=300'
Slope=0.1000 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 0.78 cfs @ 12.20 hrs, Volume= 0.082 af
Outflow = 0.09 cfs @ 13.09 hrs, Volume= 0.066 af, Atten= 88%, Lag= 53.5 min
Discarded = 0.09 cfs @ 13.09 hrs, Volume= 0.066 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 71.60' @ 13.09 hrs Surf.Area= 3,639 sf Storage= 1,973 cf

Plug-Flow detention time= 282.4 min calculated for 0.066 af (81% of inflow)
Center-of-Mass det. time= 209.2 min (972.6 - 763.4)

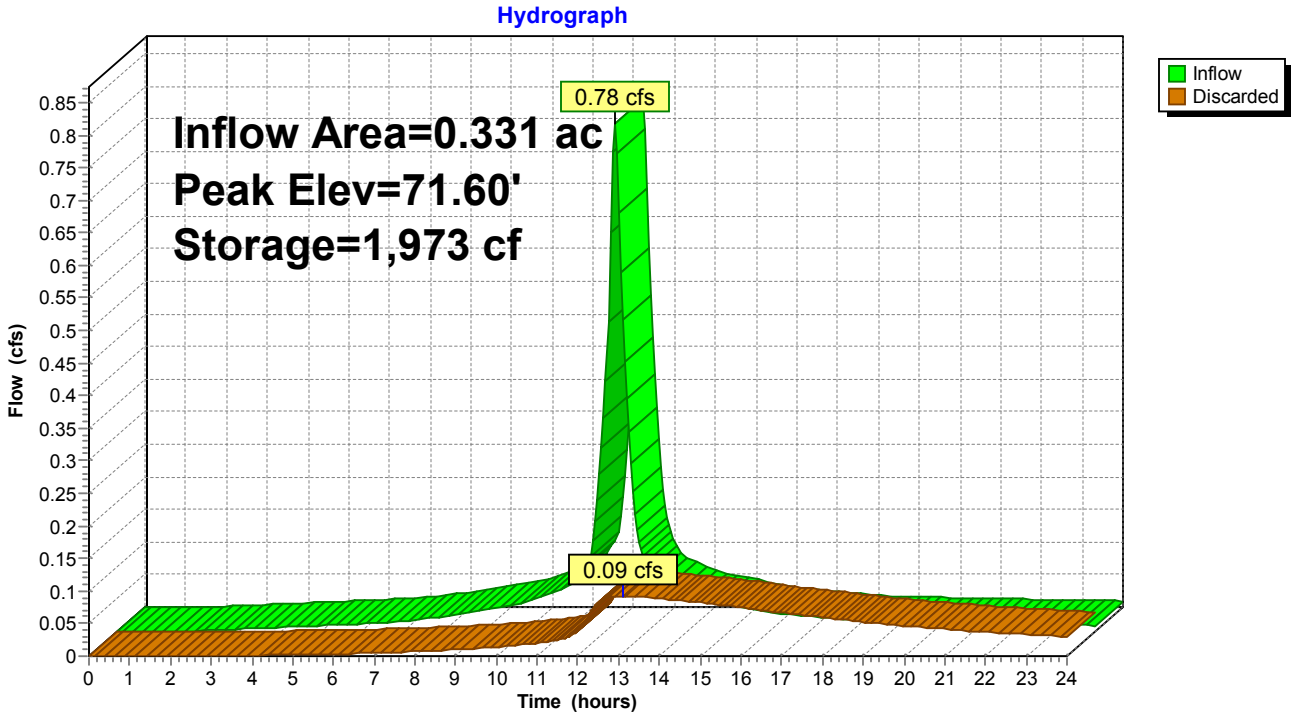
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	21,263 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,950	0	0
72.00	4,100	3,525	3,525
73.00	5,300	4,700	8,225
74.00	6,550	5,925	14,150
75.00	7,675	7,113	21,263

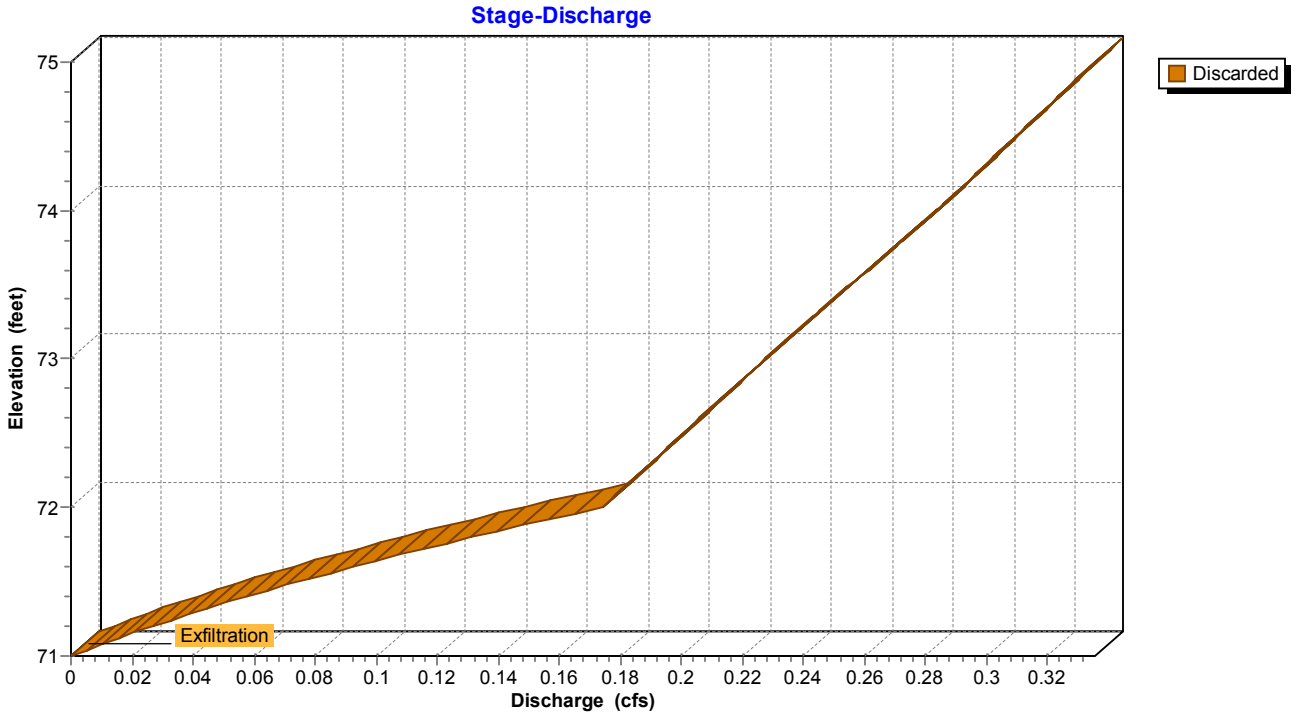
Device	Routing	Invert	Outlet Devices
#1	Discarded	71.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 8.00' Phase-In= 1.00'

Discarded OutFlow Max=0.09 cfs @ 13.09 hrs HW=71.60' (Free Discharge)
↑**1=Exfiltration** (Controls 0.09 cfs)

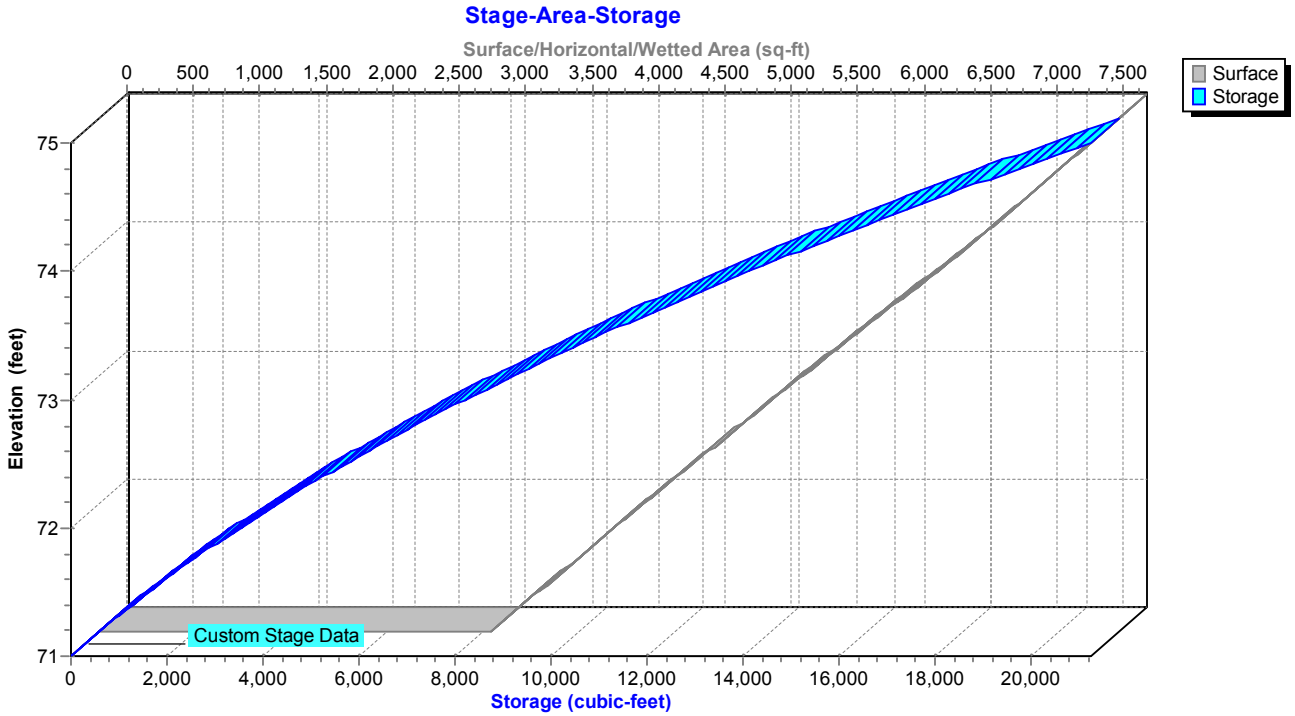
Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.79% Impervious, Inflow Depth > 1.89" for 2 year storm event
Inflow = 4.10 cfs @ 12.21 hrs, Volume= 0.434 af
Outflow = 1.41 cfs @ 12.62 hrs, Volume= 0.329 af, Atten= 66%, Lag= 24.7 min
Secondary = 1.41 cfs @ 12.62 hrs, Volume= 0.329 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.46' @ 12.62 hrs Surf.Area= 0.196 ac Storage= 0.211 af

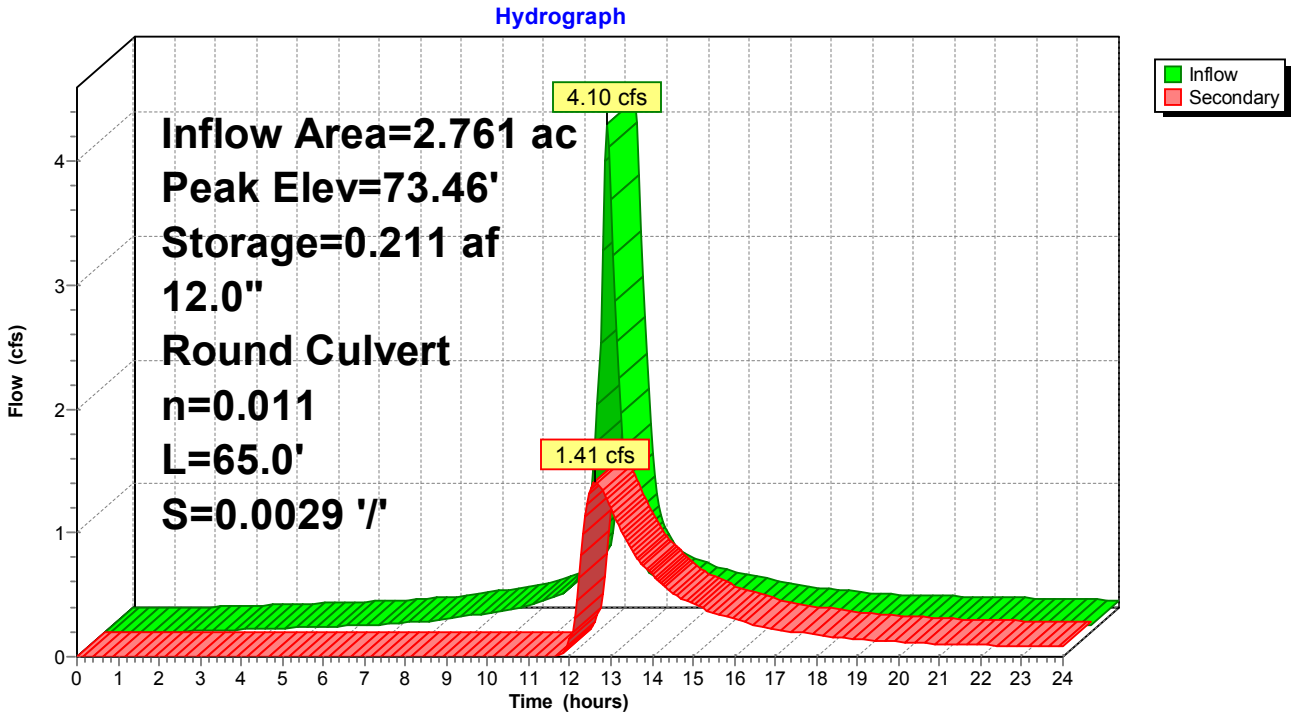
Plug-Flow detention time= 207.5 min calculated for 0.329 af (76% of inflow)
Center-of-Mass det. time= 120.3 min (908.5 - 788.1)

Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

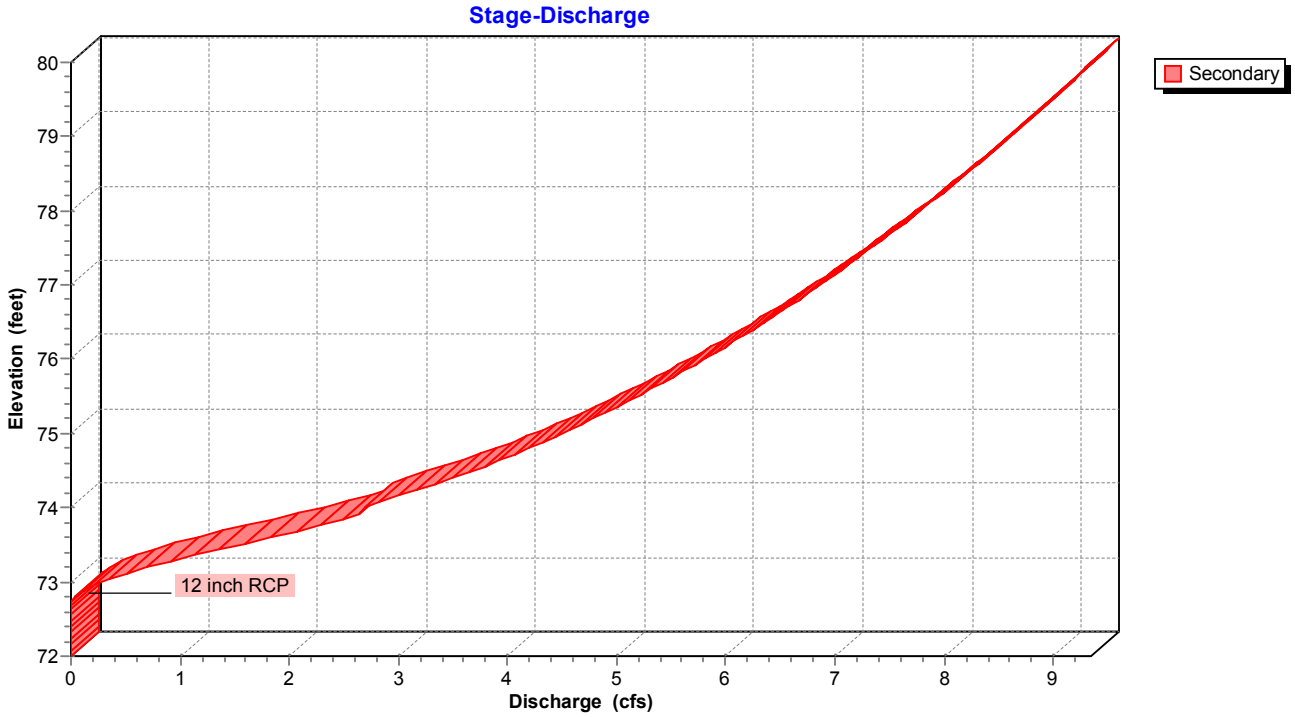
Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Secondary OutFlow Max=1.41 cfs @ 12.62 hrs HW=73.46' (Free Discharge)
1=12 inch RCP (Barrel Controls 1.41 cfs @ 2.97 fps)

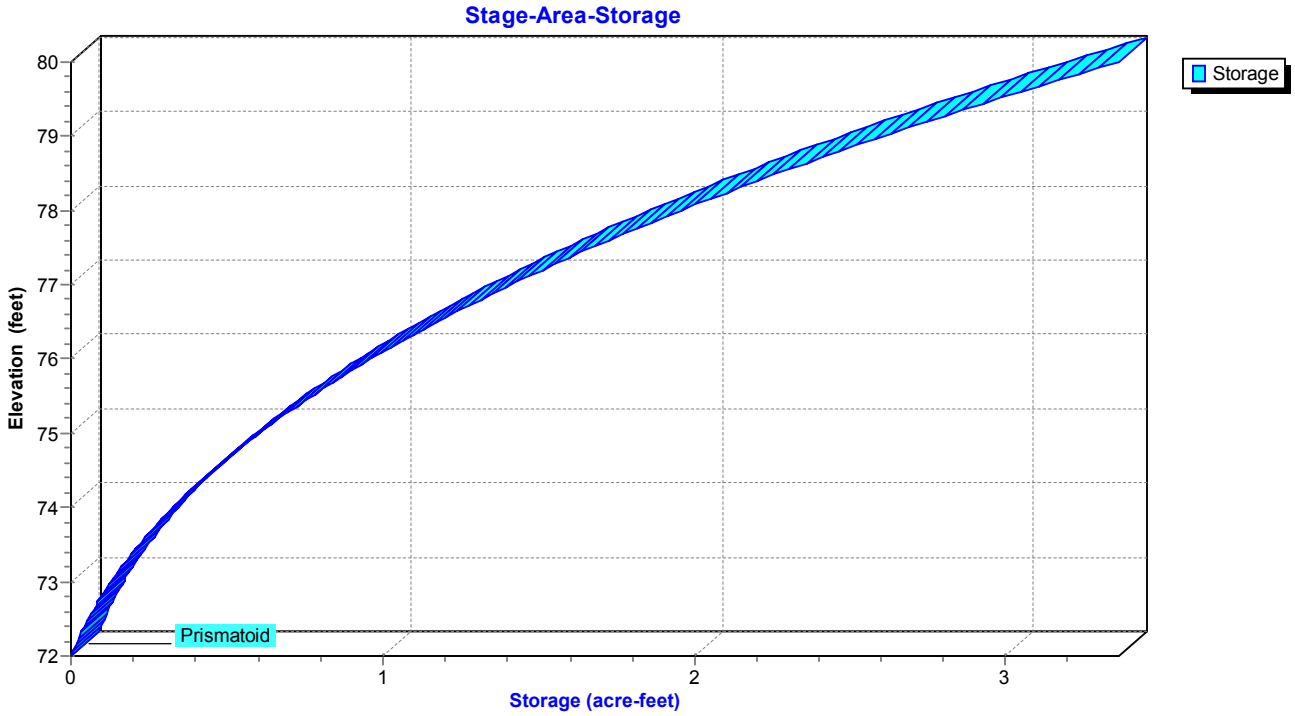
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



...ary for Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage

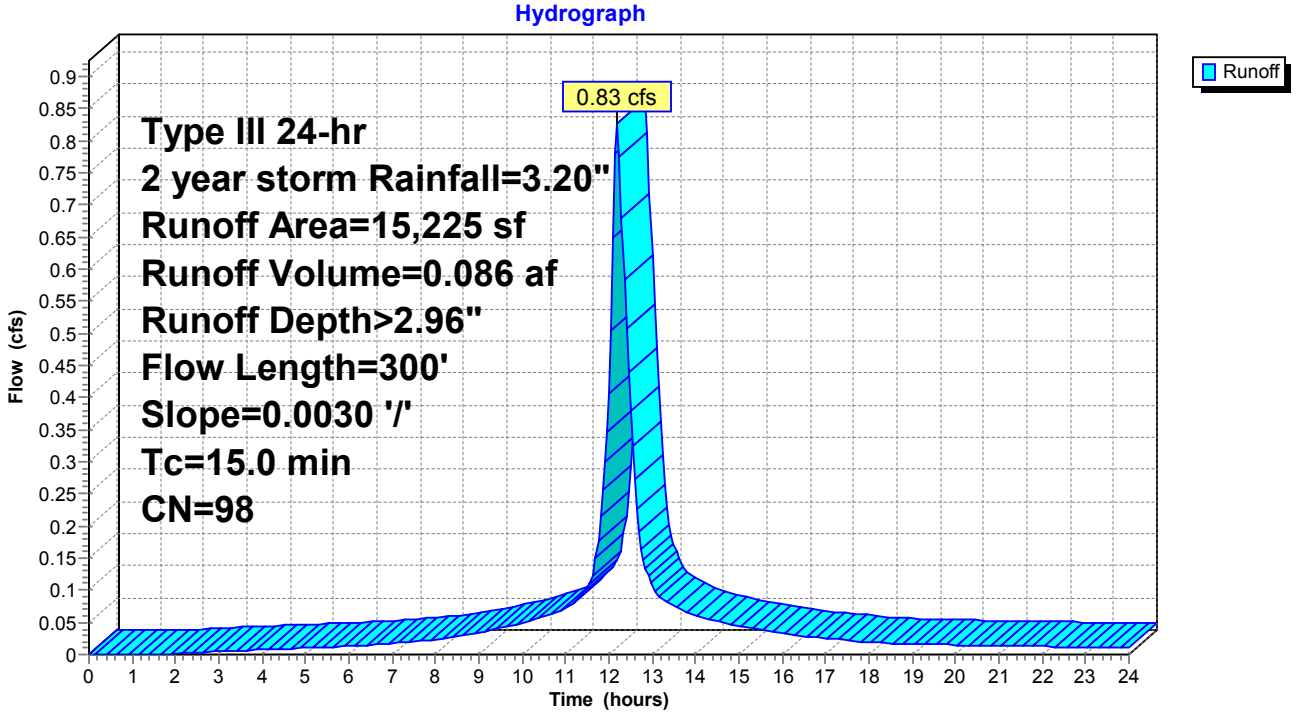
Runoff = 0.83 cfs @ 12.20 hrs, Volume= 0.086 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
15,225	98	Paved roads w/curbs & sewers, HSG A
15,225		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	300	0.0030	0.78		**Sheet Flow, overland runoff toward stone ballast areas** Smooth surfaces n= 0.011 P2= 3.00"
6.4	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage tracks



Summary for Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin

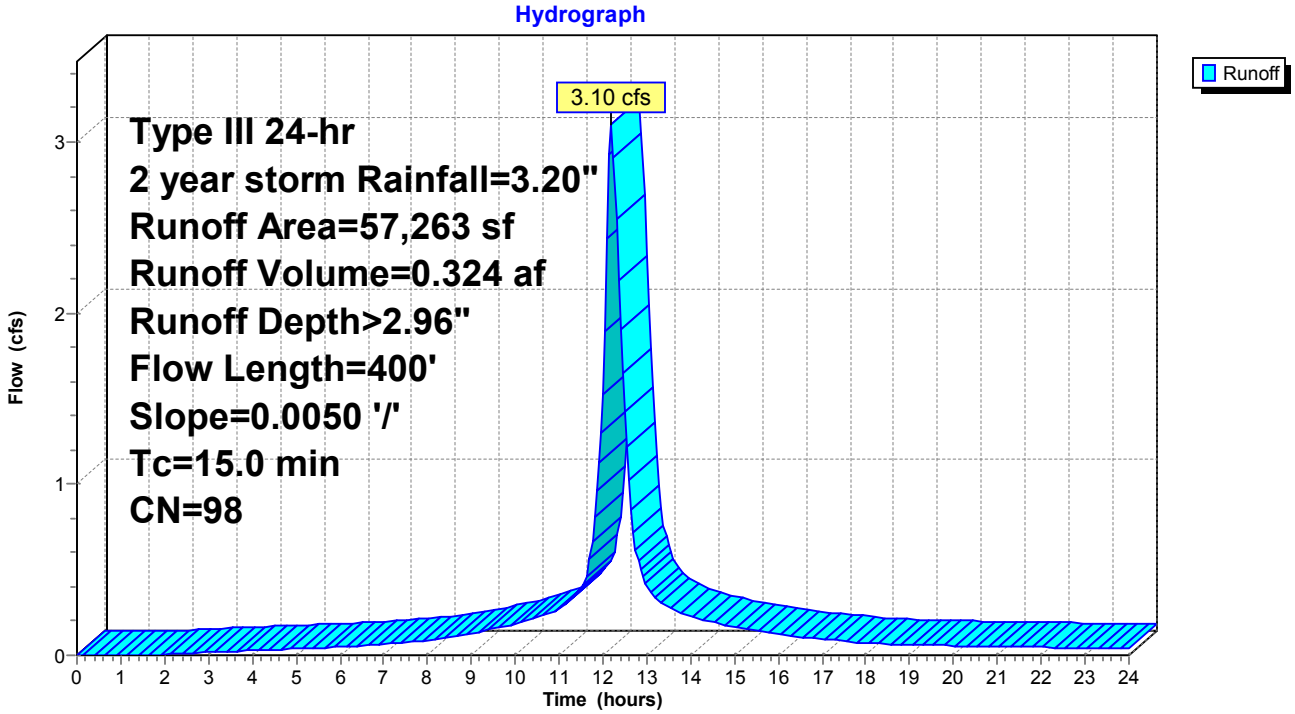
Runoff = 3.10 cfs @ 12.20 hrs, Volume= 0.324 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
57,263	98	Paved roads w/curbs & sewers, HSG A
57,263		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	200	0.0050	0.88		**Sheet Flow, Proposed Paved Surface Areaa** Smooth surfaces n= 0.011 P2= 3.00"
2.3	200	0.0050	1.44		**Shallow Concentrated Flow, Proposed Paved Surface Area** Paved Kv= 20.3 fps
6.1	400	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin



Summary for Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 4.24 cfs @ 12.20 hrs, Volume= 0.443 af
Outflow = 0.31 cfs @ 14.02 hrs, Volume= 0.321 af, Atten= 93%, Lag= 109.4 min
Discarded = 0.31 cfs @ 14.02 hrs, Volume= 0.321 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 72.44' @ 14.02 hrs Surf.Area= 7,249 sf Storage= 11,448 cf

Plug-Flow detention time= 339.5 min calculated for 0.320 af (72% of inflow)
Center-of-Mass det. time= 251.1 min (1,014.5 - 763.4)

Volume	Invert	Avail.Storage	Storage Description
#1	70.50'	35,623 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

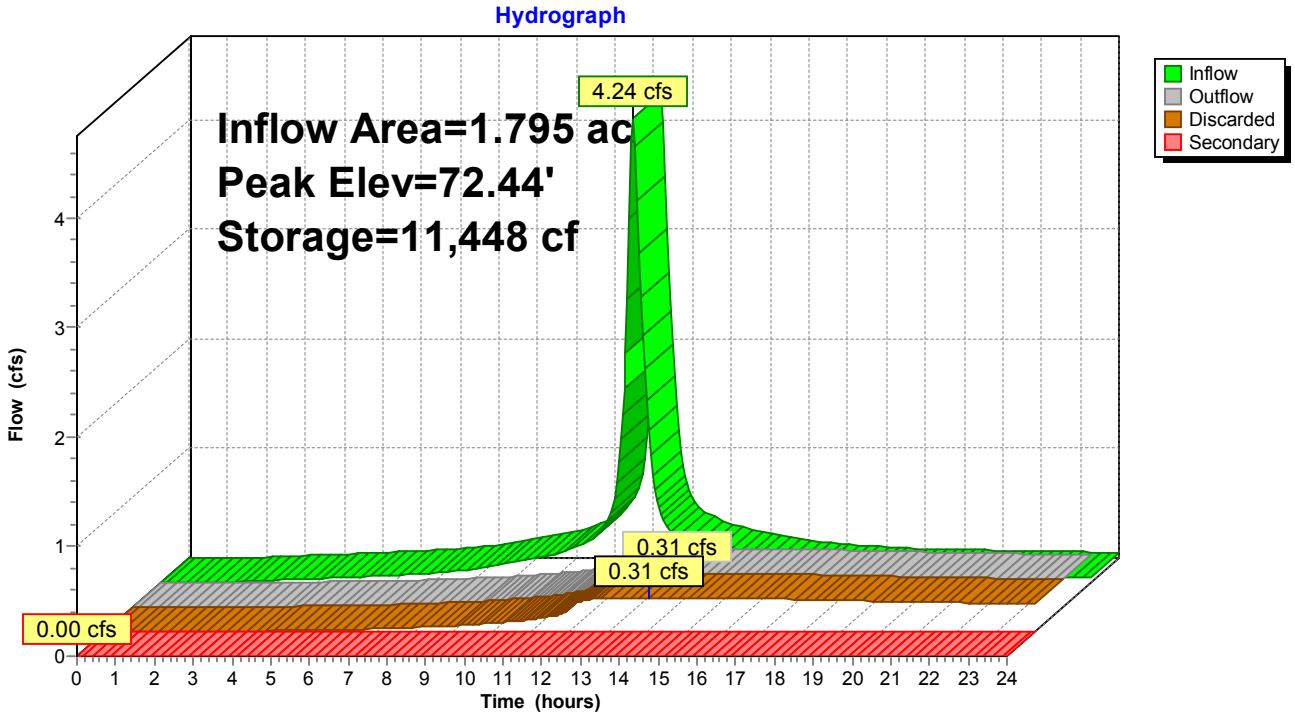
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.50	4,780	0	0
71.00	5,240	2,505	2,505
72.00	6,535	5,888	8,393
73.00	8,145	7,340	15,733
74.00	9,865	9,005	24,738
75.00	11,905	10,885	35,623

Device	Routing	Invert	Outlet Devices
#1	Discarded	70.50'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.50' Phase-In= 1.00'
#2	Secondary	73.50'	**8.0" Horiz. Orifice/Grate** C= 0.600 in 60.0" x 60.0" Grate (1% open area)

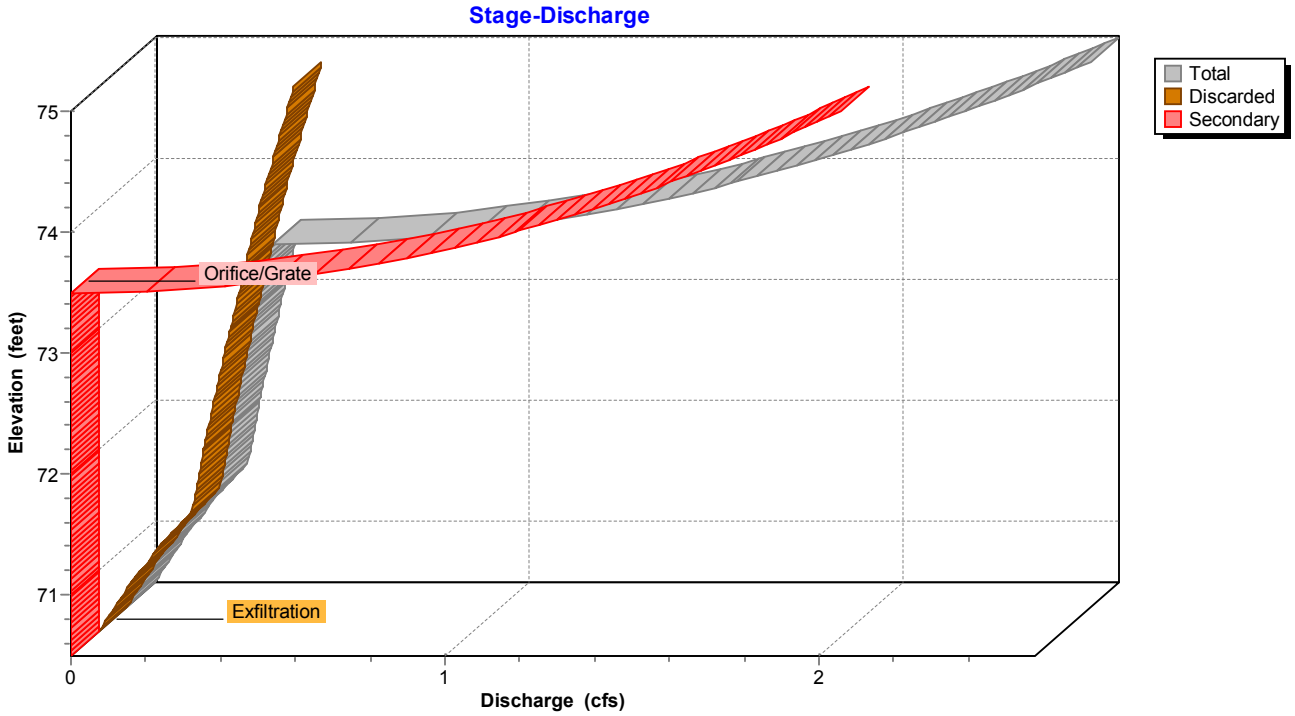
Discarded OutFlow Max=0.31 cfs @ 14.02 hrs HW=72.44' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.31 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=70.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

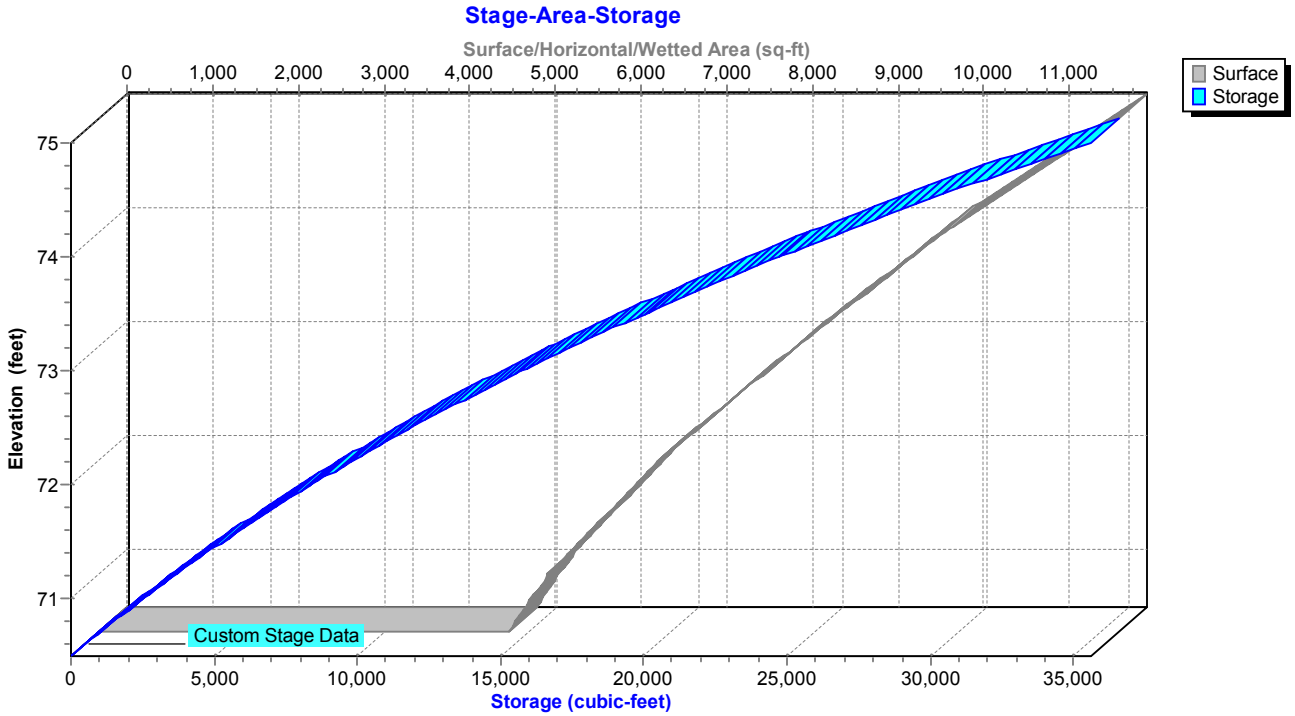
Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Summary for Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2

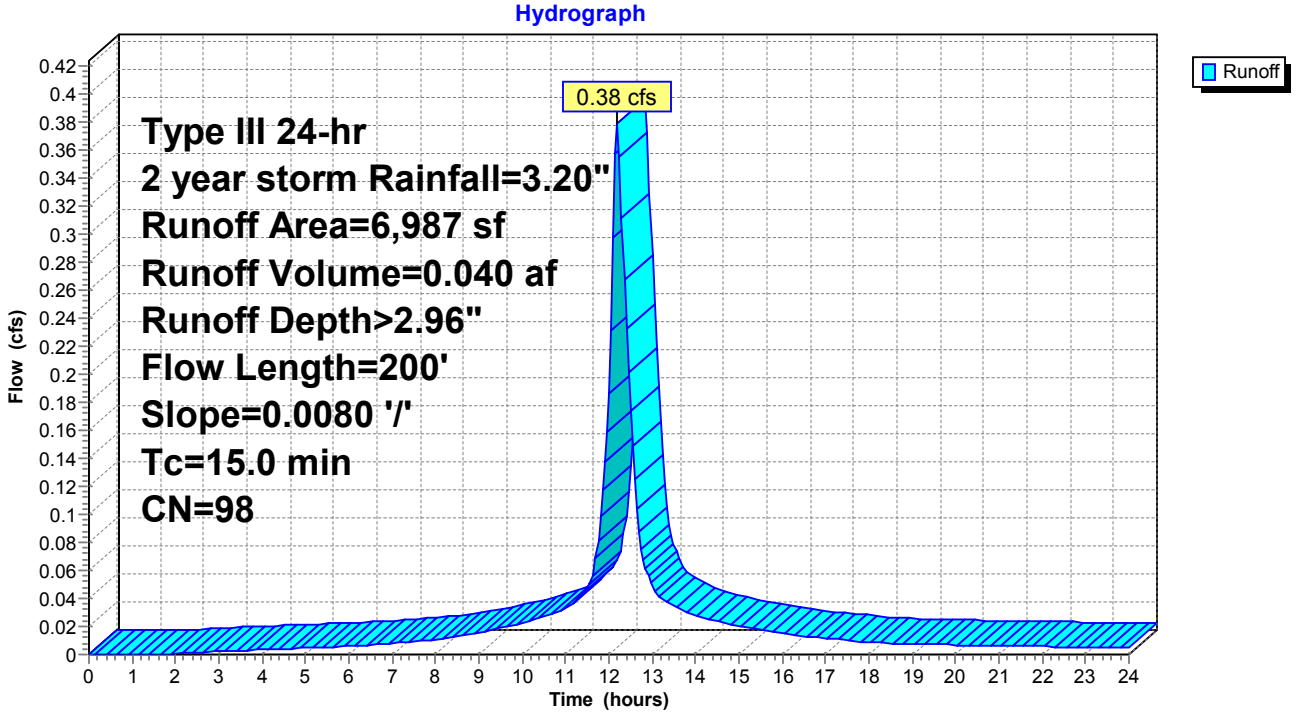
Runoff = 0.38 cfs @ 12.20 hrs, Volume= 0.040 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
6,987	98	Paved parking, HSG A
6,987		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	200	0.0080	1.06		**Sheet Flow, New paved driveway to Kings HWY** Smooth surfaces n= 0.011 P2= 3.00"
3.1	200	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2



or Pond PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped

Inflow Area = 0.350 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 0.83 cfs @ 12.20 hrs, Volume= 0.086 af
Outflow = 0.17 cfs @ 12.73 hrs, Volume= 0.083 af, Atten= 79%, Lag= 32.1 min
Discarded = 0.17 cfs @ 12.73 hrs, Volume= 0.083 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.11' @ 12.73 hrs Surf.Area= 37,697 sf Storage= 1,658 cf

Plug-Flow detention time= 153.6 min calculated for 0.082 af (96% of inflow)
Center-of-Mass det. time= 128.9 min (892.3 - 763.4)

Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	90,473 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 226,182 cf Overall x 40.0% Voids

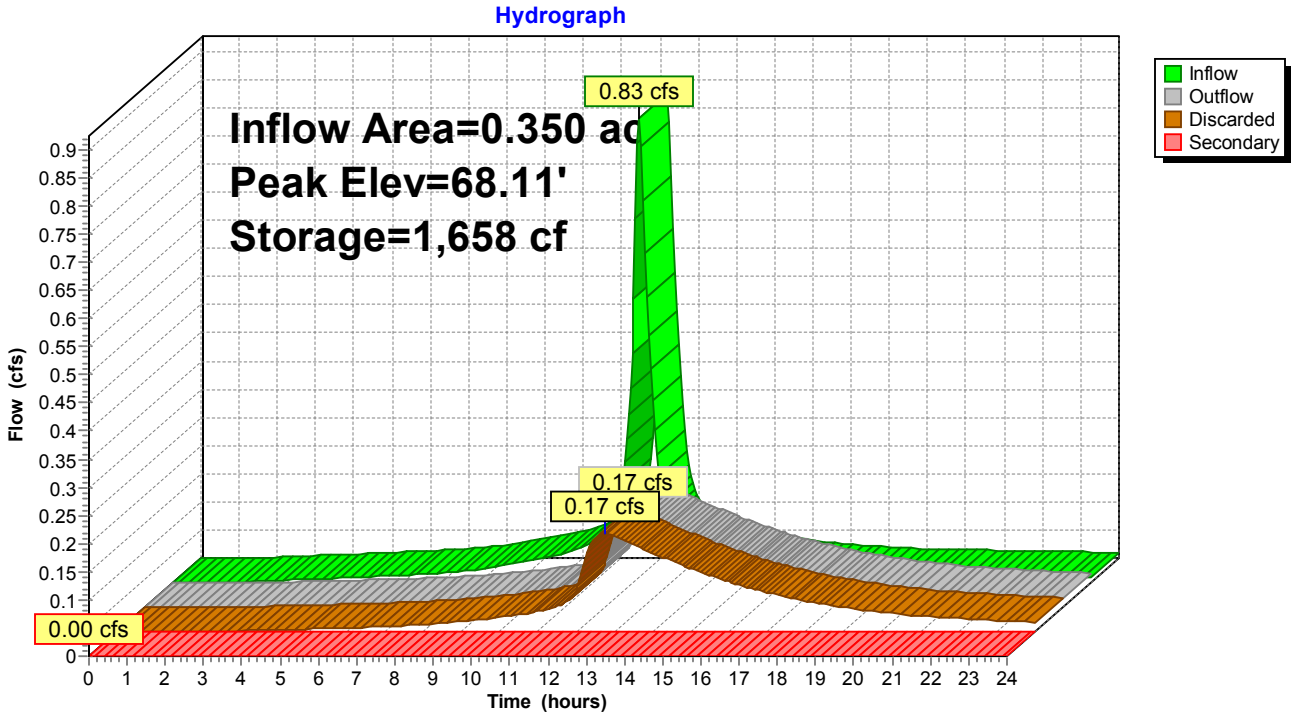
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.00	37,697	0	0
69.00	37,697	37,697	37,697
70.00	37,697	37,697	75,394
71.00	37,697	37,697	113,091
72.00	37,697	37,697	150,788
73.00	37,697	37,697	188,485
74.00	37,697	37,697	226,182

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.00' Phase-In= 1.00'
#2	Secondary	73.50'	**18.0" Round Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 73.50' / 73.20' S= 0.0030 '/' Cc= 0.900 n= 0.014 Steel, smooth, Flow Area= 1.77 sf

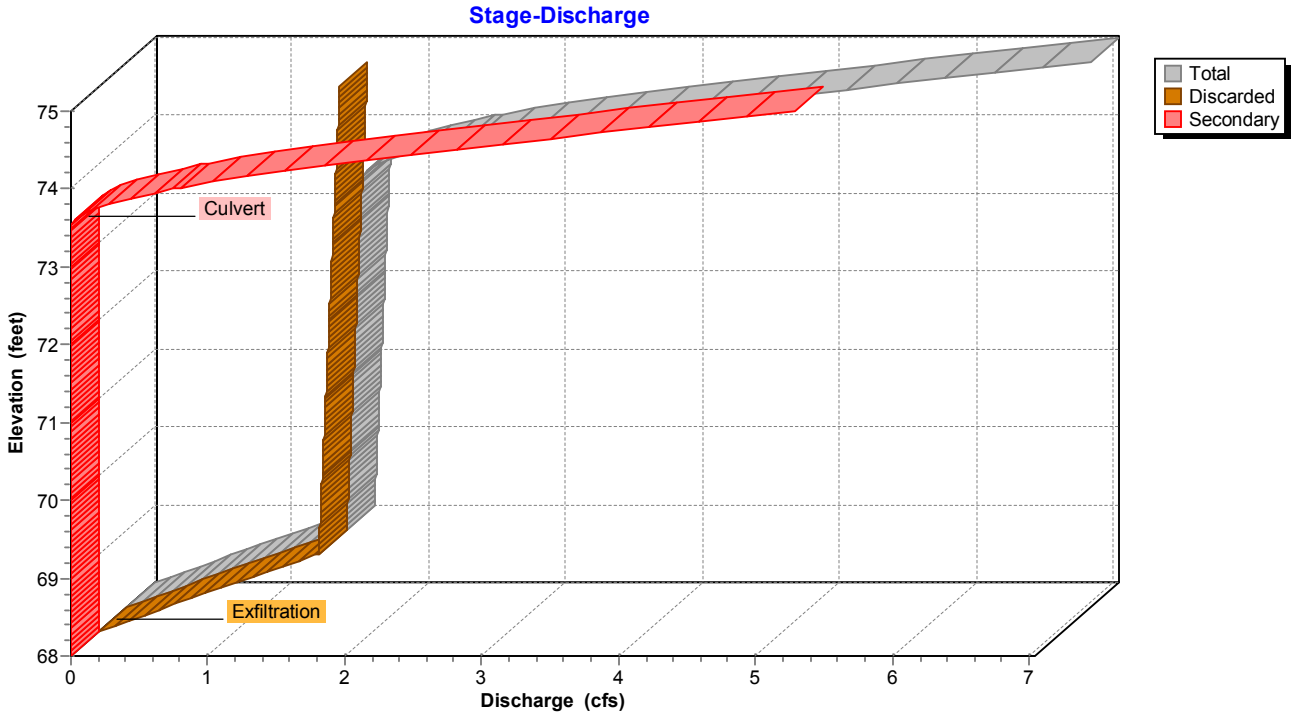
Discarded OutFlow Max=0.17 cfs @ 12.73 hrs HW=68.11' (Free Discharge)
1=Exfiltration (Controls 0.17 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.00' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

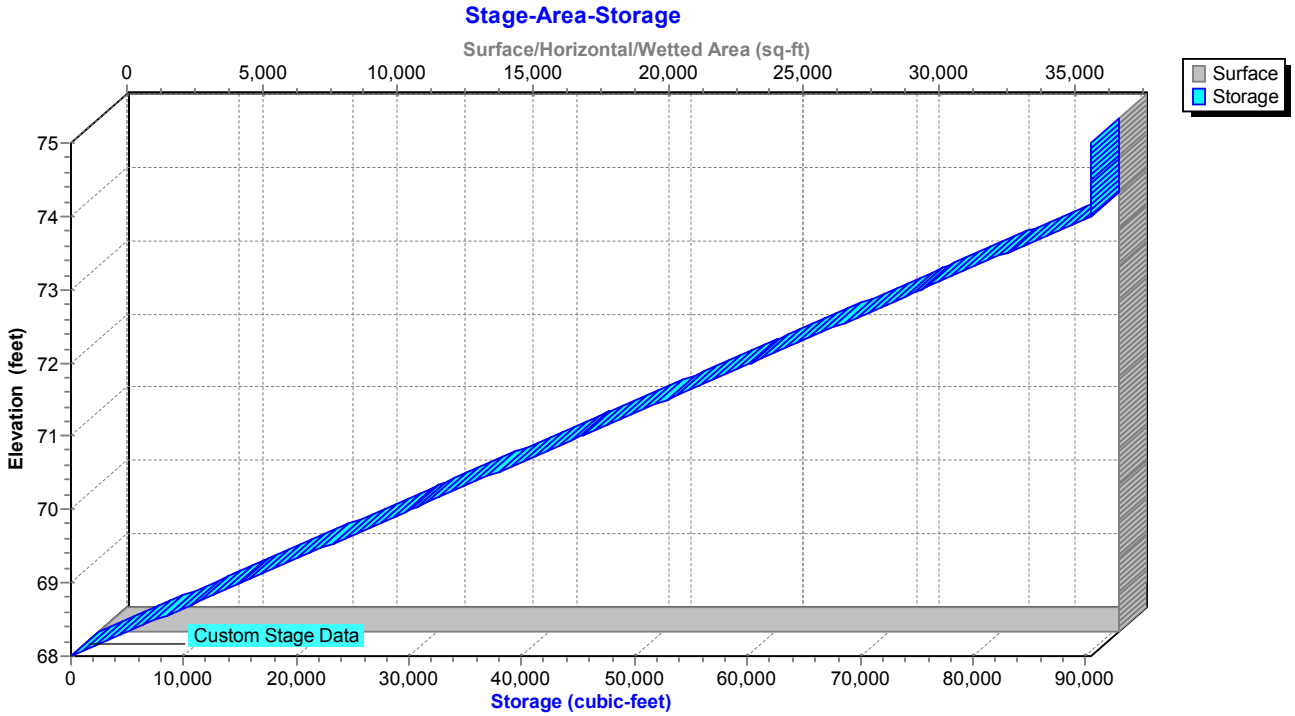
d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



Summary for Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks

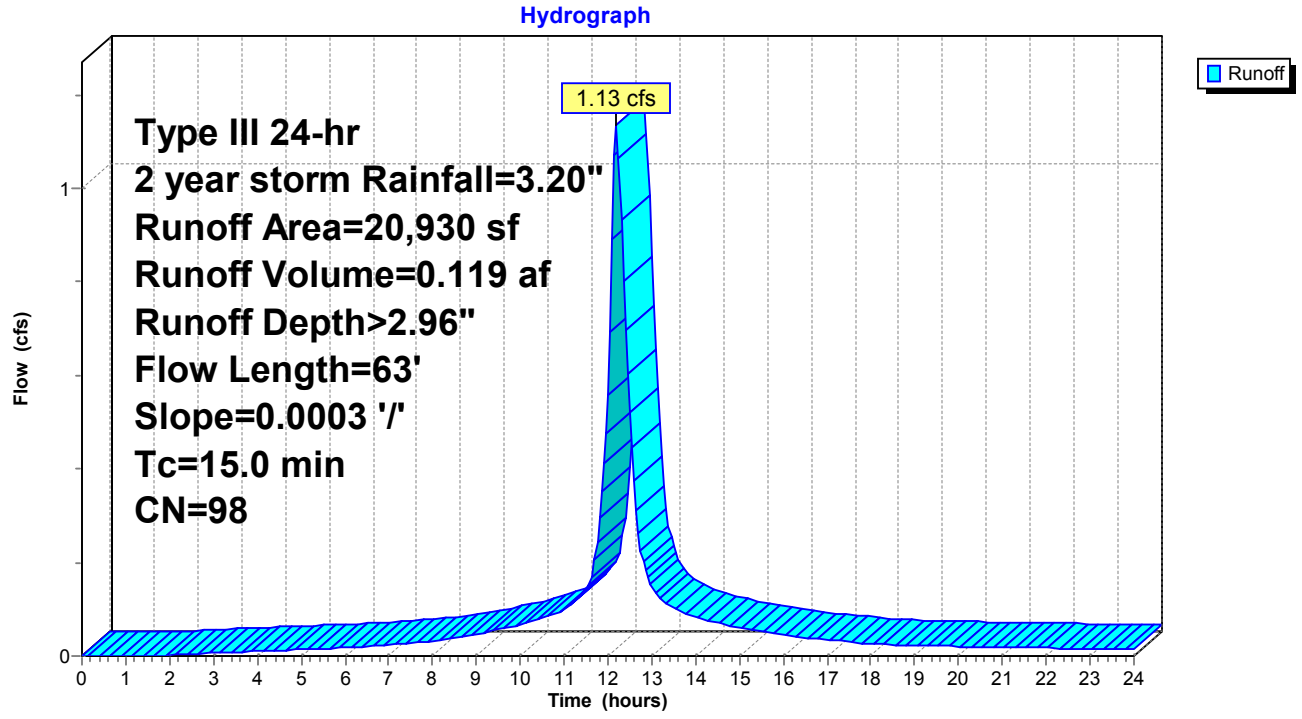
Runoff = 1.13 cfs @ 12.20 hrs, Volume= 0.119 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks



Summary for Pond W 1: Existing Wetland Area 1

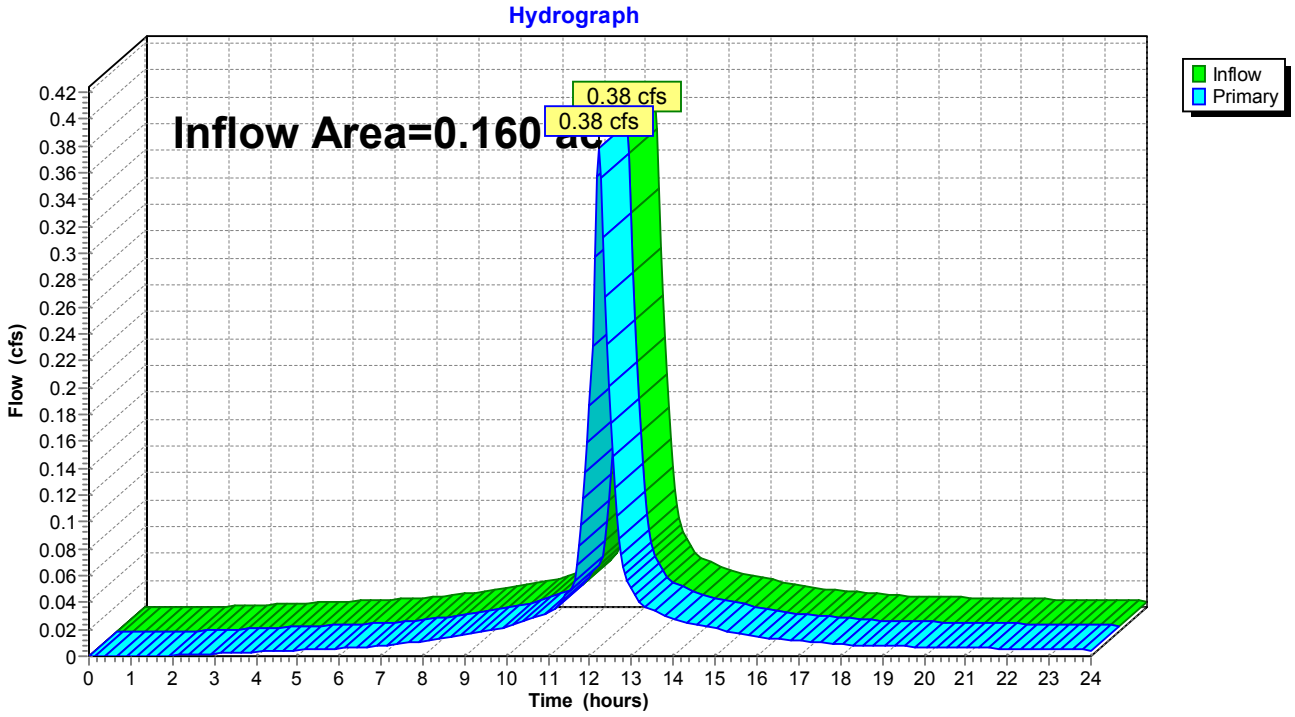
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.160 ac,100.00% Impervious, Inflow Depth > 2.96" for 2 year storm event
Inflow = 0.38 cfs @ 12.20 hrs, Volume= 0.040 af
Primary = 0.38 cfs @ 12.20 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2



Summary for Pond W 3: Existing Wetland Area 3

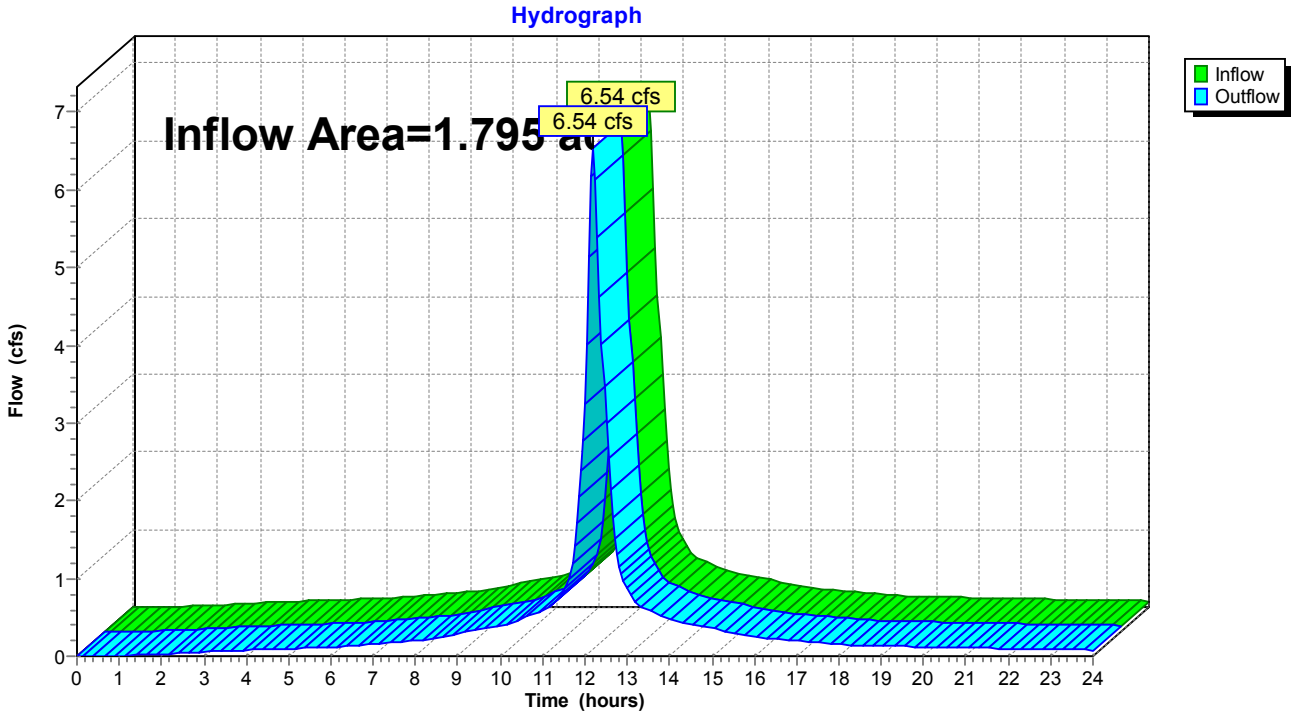
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

...ary for Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 6.54 cfs @ 12.20 hrs, Volume= 0.696 af
Outflow = 6.54 cfs @ 12.20 hrs, Volume= 0.696 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention Basin

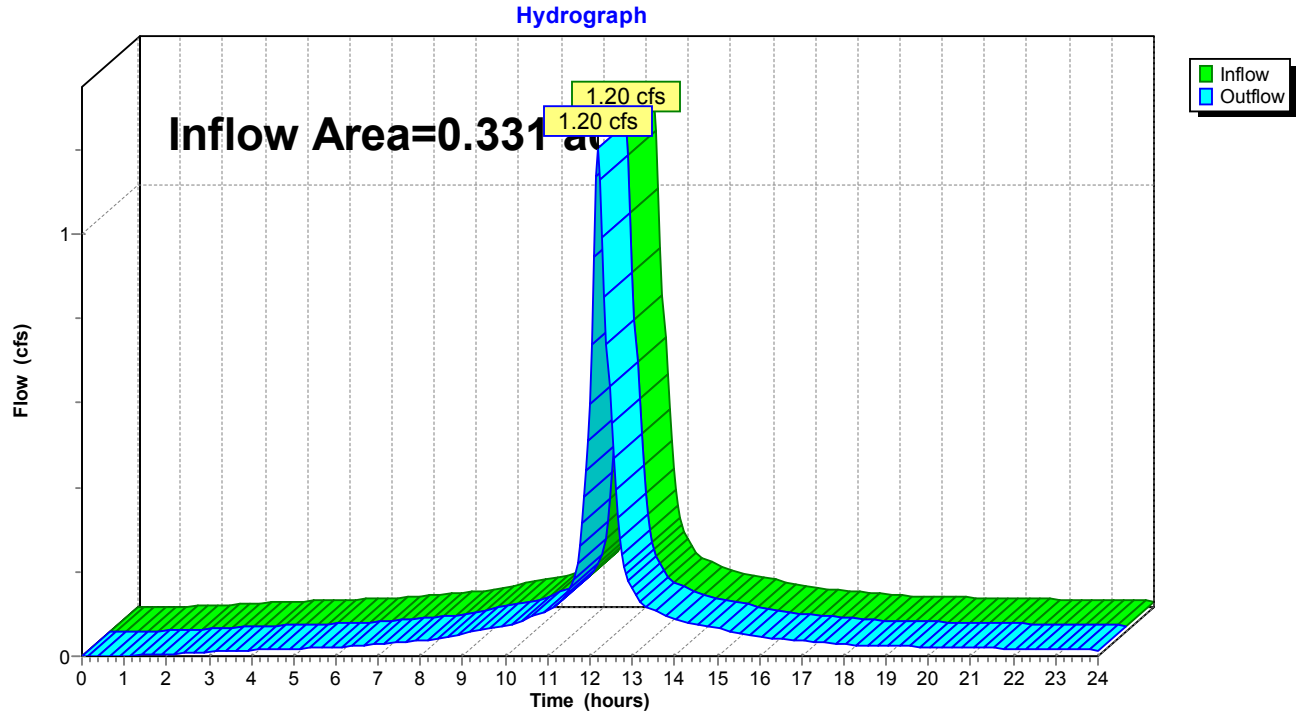


Summary for Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af
Outflow = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

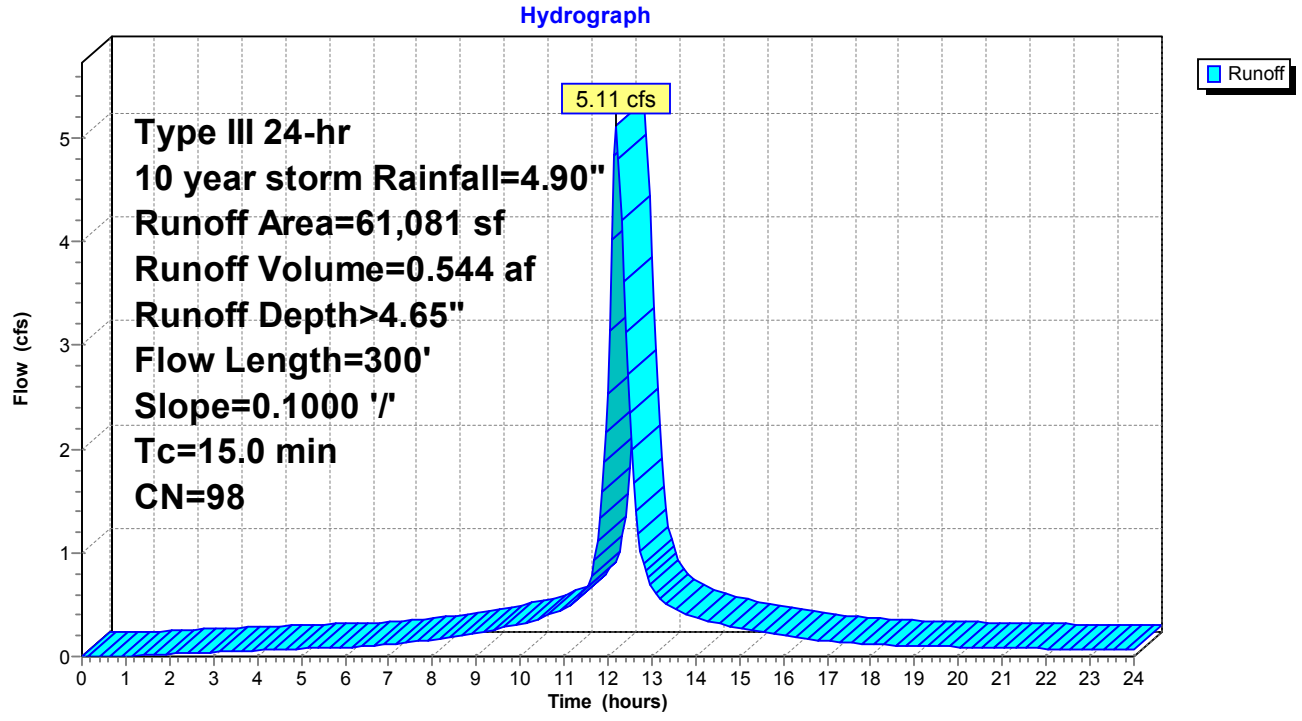
Runoff = 5.11 cfs @ 12.20 hrs, Volume= 0.544 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
61,081	98	Roofs, HSG A
61,081		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

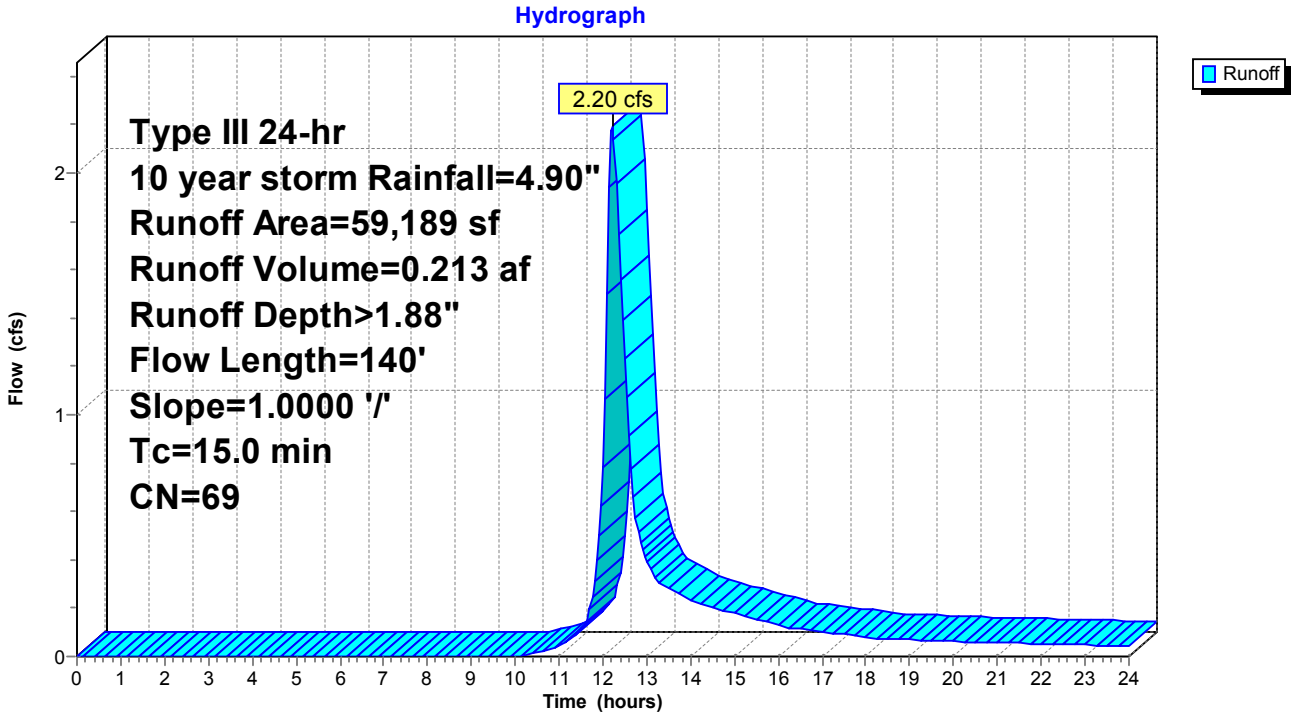
Runoff = 2.20 cfs @ 12.22 hrs, Volume= 0.213 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
59,189	69	50-75% Grass cover, Fair, HSG B
59,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

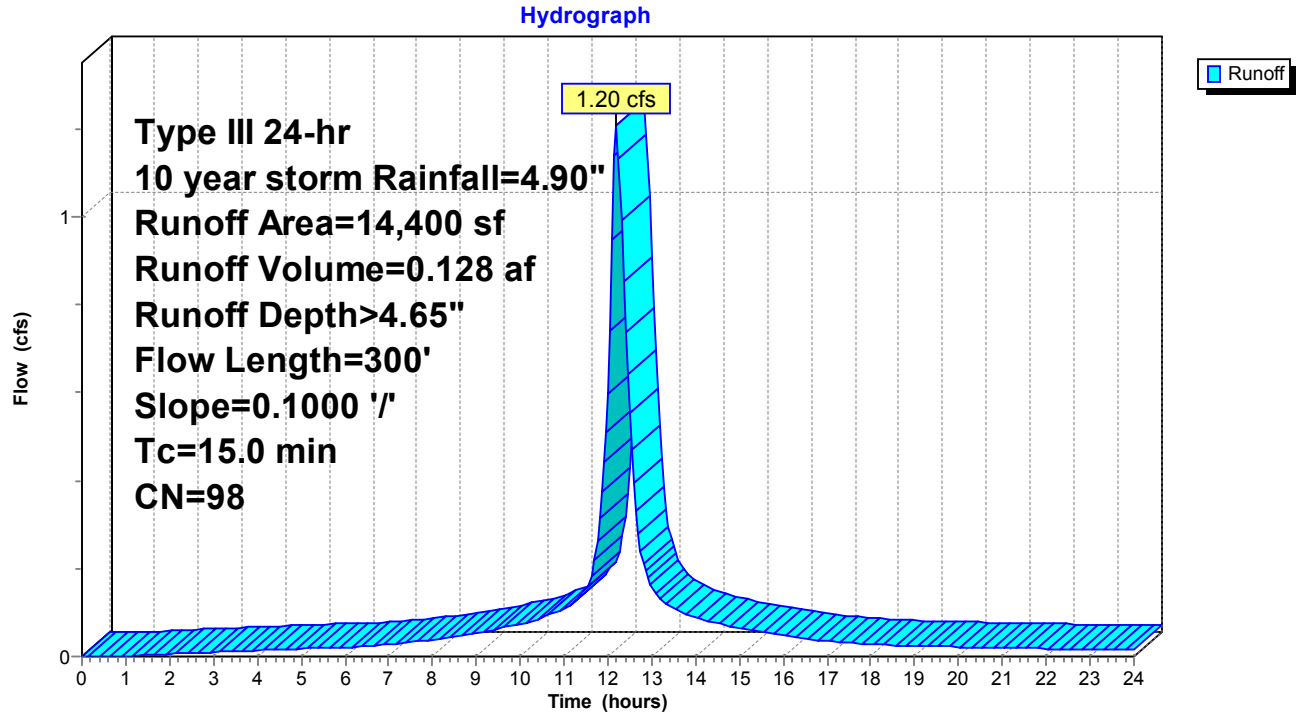
Runoff = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 1.20 cfs @ 12.20 hrs, Volume= 0.128 af
Outflow = 0.15 cfs @ 13.04 hrs, Volume= 0.105 af, Atten= 88%, Lag= 50.8 min
Discarded = 0.15 cfs @ 13.04 hrs, Volume= 0.105 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 71.89' @ 13.04 hrs Surf.Area= 3,969 sf Storage= 3,064 cf

Plug-Flow detention time= 278.7 min calculated for 0.105 af (82% of inflow)
Center-of-Mass det. time= 207.2 min (962.6 - 755.4)

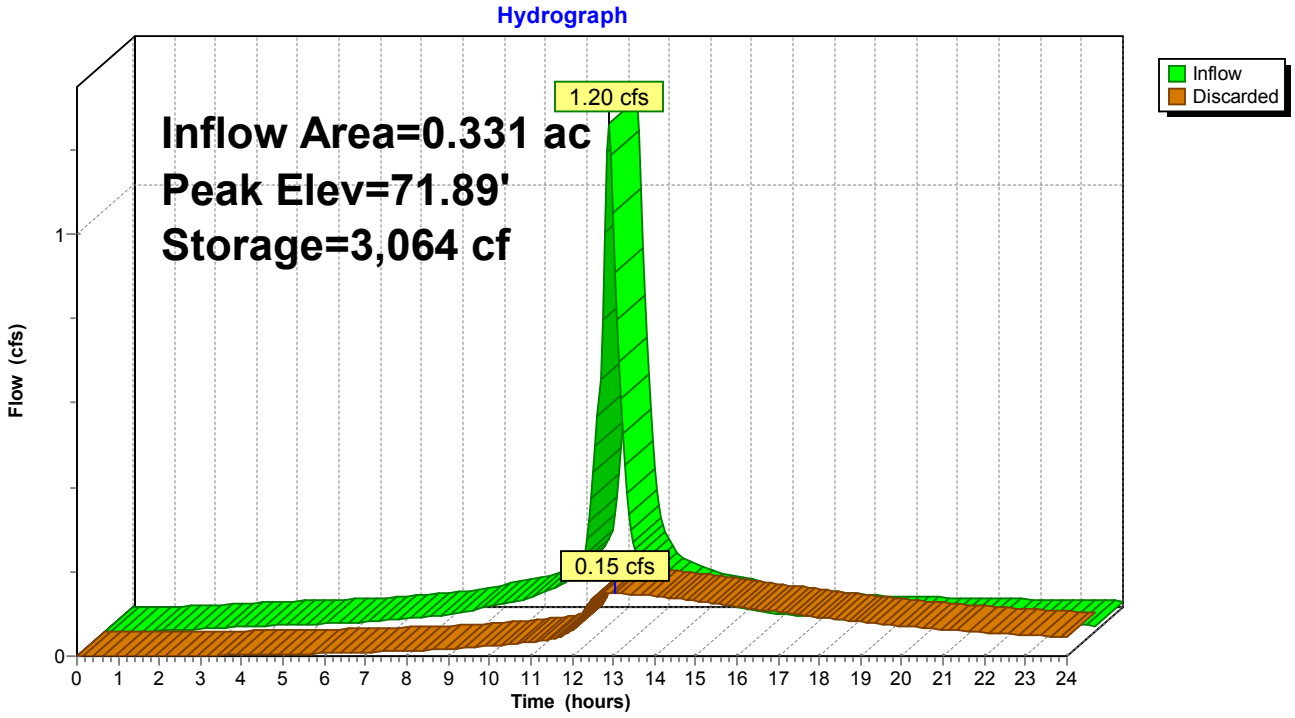
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	21,263 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,950	0	0
72.00	4,100	3,525	3,525
73.00	5,300	4,700	8,225
74.00	6,550	5,925	14,150
75.00	7,675	7,113	21,263

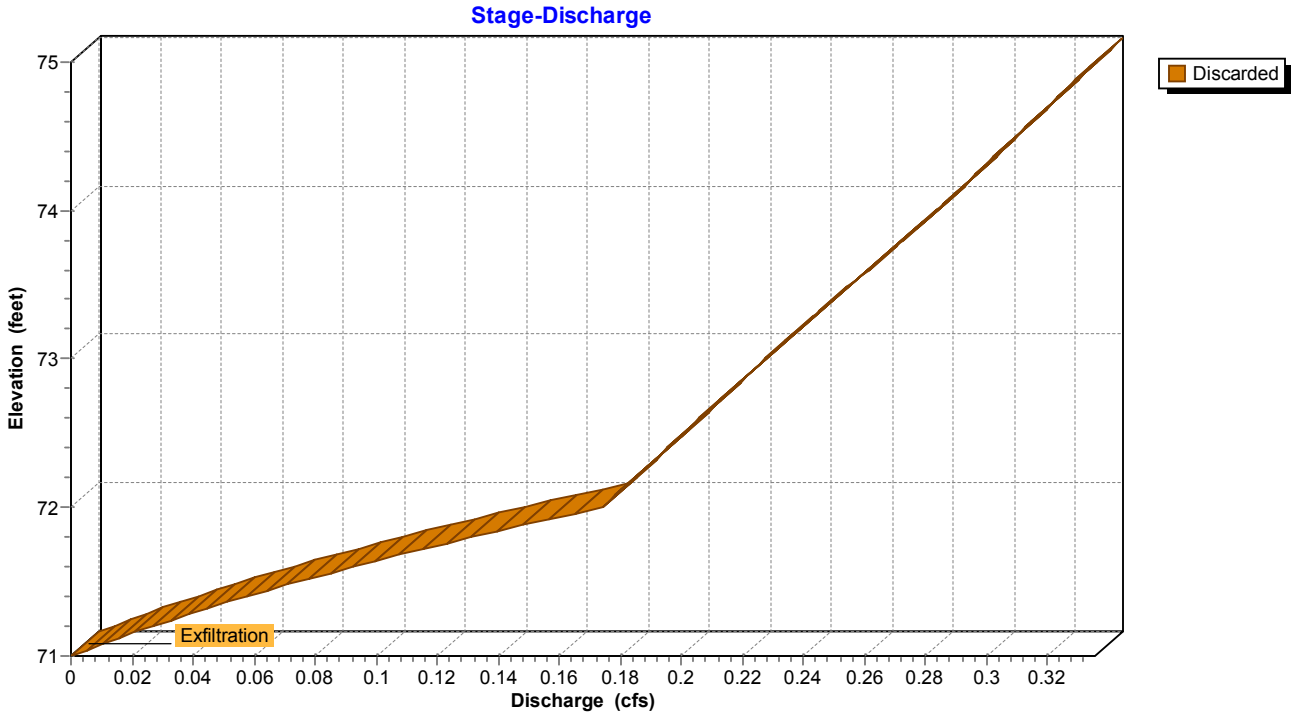
Device	Routing	Invert	Outlet Devices
#1	Discarded	71.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 8.00' Phase-In= 1.00'

Discarded OutFlow Max=0.15 cfs @ 13.04 hrs HW=71.89' (Free Discharge)
↑**1=Exfiltration** (Controls 0.15 cfs)

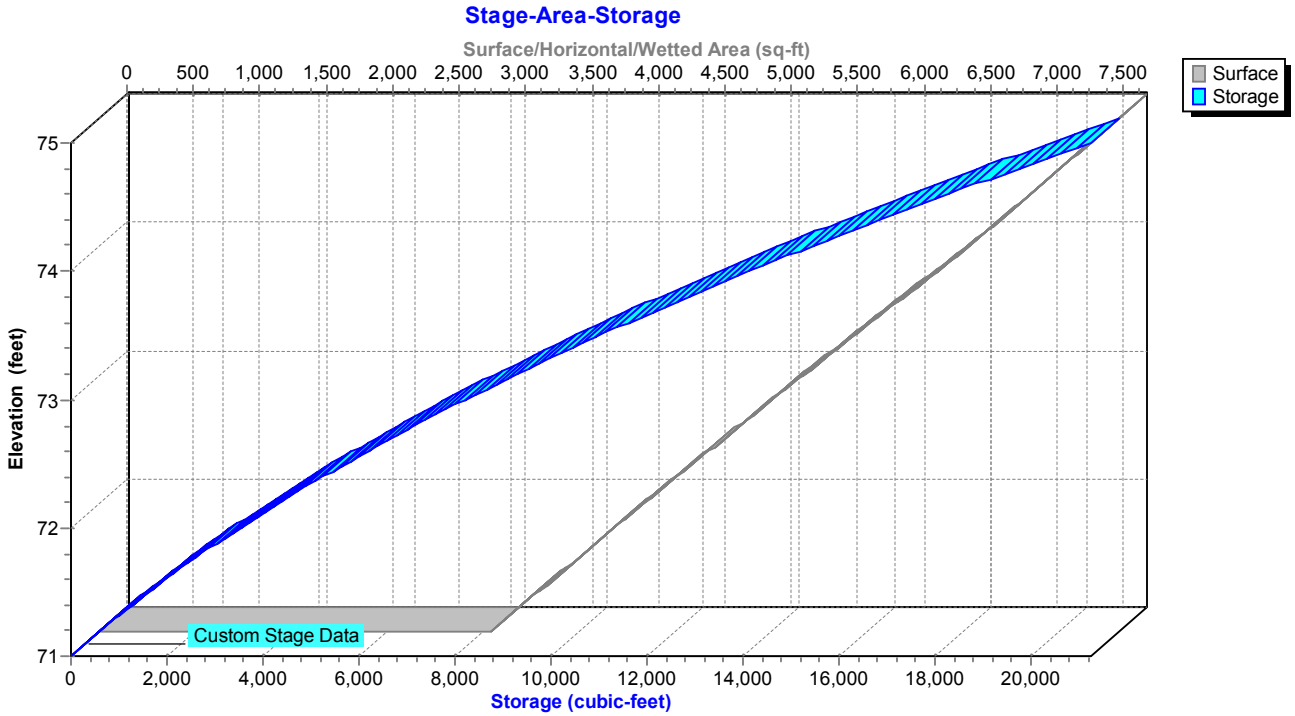
Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.79% Impervious, Inflow Depth > 3.29" for 10 year storm event
Inflow = 7.29 cfs @ 12.20 hrs, Volume= 0.757 af
Outflow = 2.67 cfs @ 12.59 hrs, Volume= 0.645 af, Atten= 63%, Lag= 23.3 min
Secondary = 2.67 cfs @ 12.59 hrs, Volume= 0.645 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.97' @ 12.59 hrs Surf.Area= 0.234 ac Storage= 0.321 af

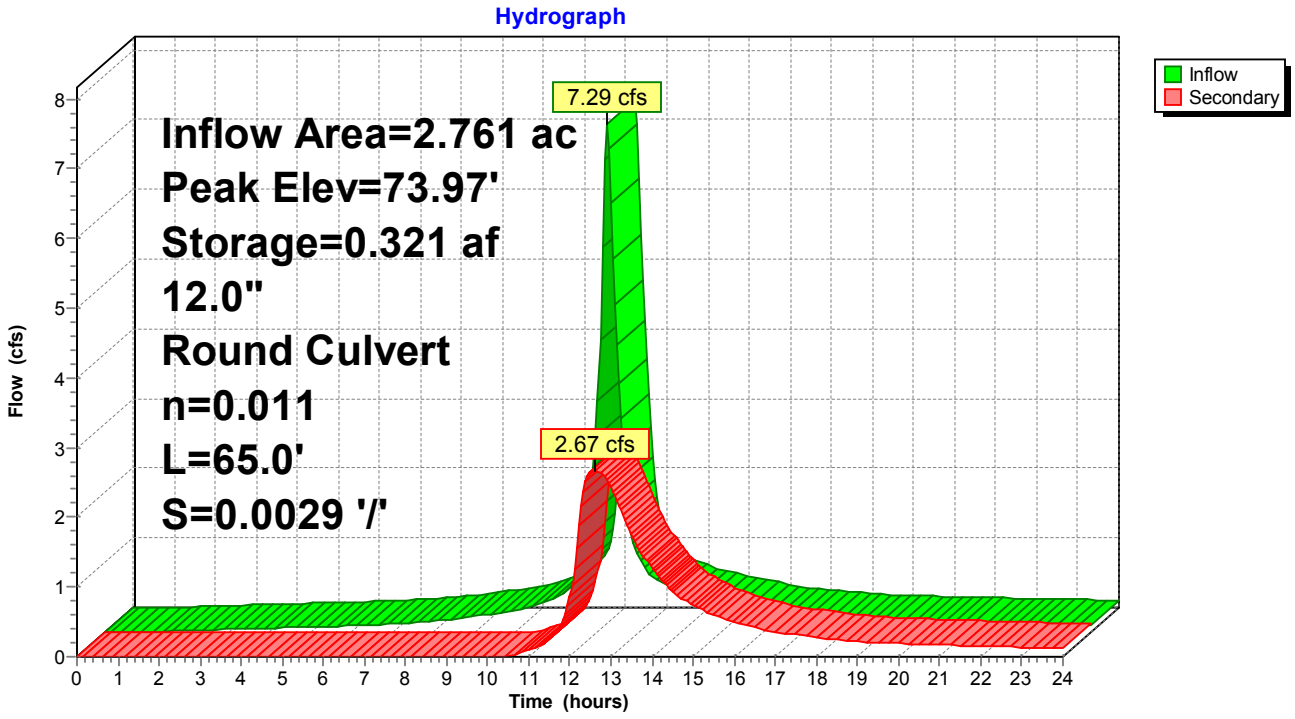
Plug-Flow detention time= 161.8 min calculated for 0.644 af (85% of inflow)
Center-of-Mass det. time= 97.7 min (881.9 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

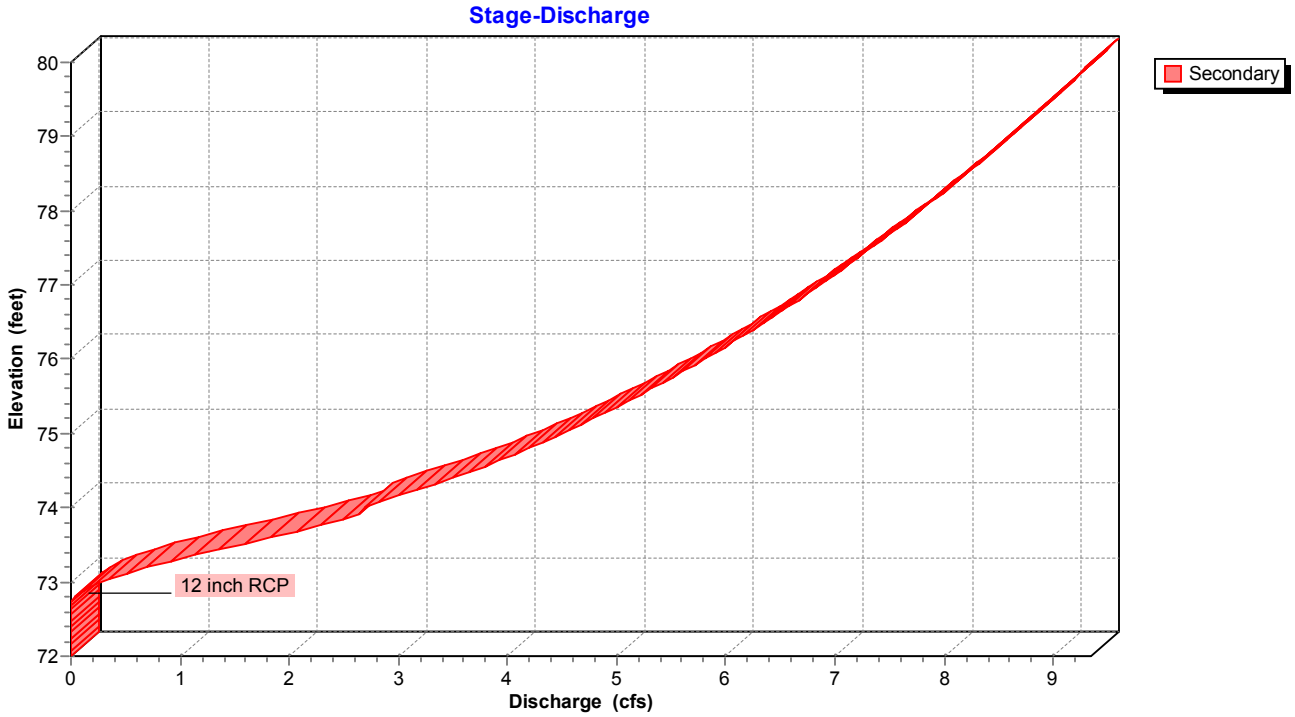
Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Secondary OutFlow Max=2.69 cfs @ 12.59 hrs HW=73.97' (Free Discharge)
1=12 inch RCP (Barrel Controls 2.69 cfs @ 3.46 fps)

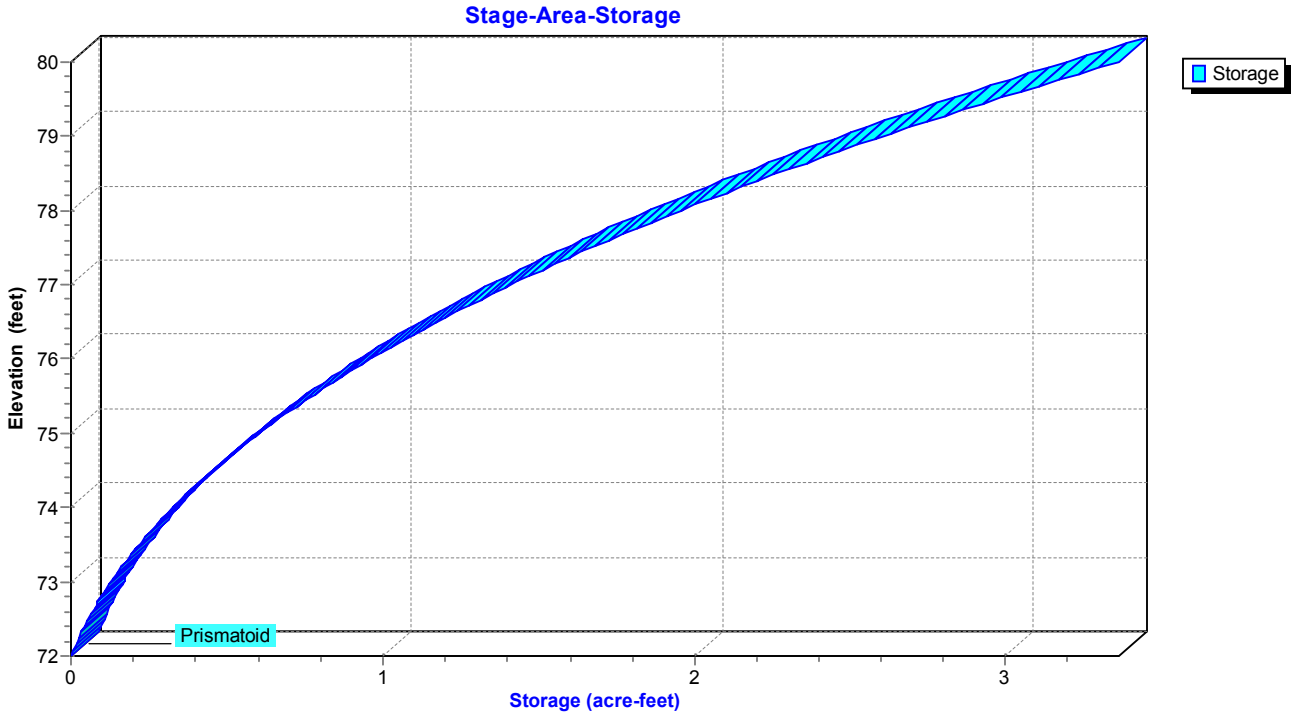
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



...ary for Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage

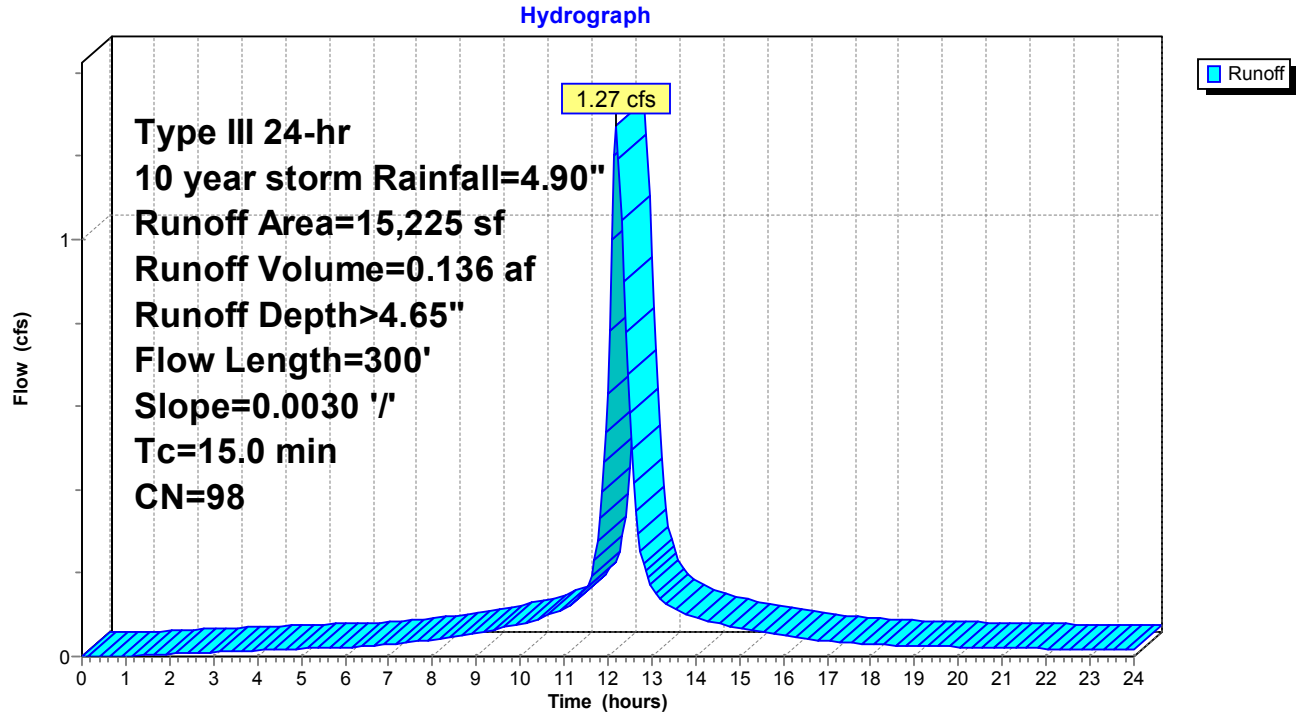
Runoff = 1.27 cfs @ 12.20 hrs, Volume= 0.136 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
15,225	98	Paved roads w/curbs & sewers, HSG A
15,225		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	300	0.0030	0.78		**Sheet Flow, overland runoff toward stone ballast areas** Smooth surfaces n= 0.011 P2= 3.00"
6.4	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage tracks



Summary for Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin

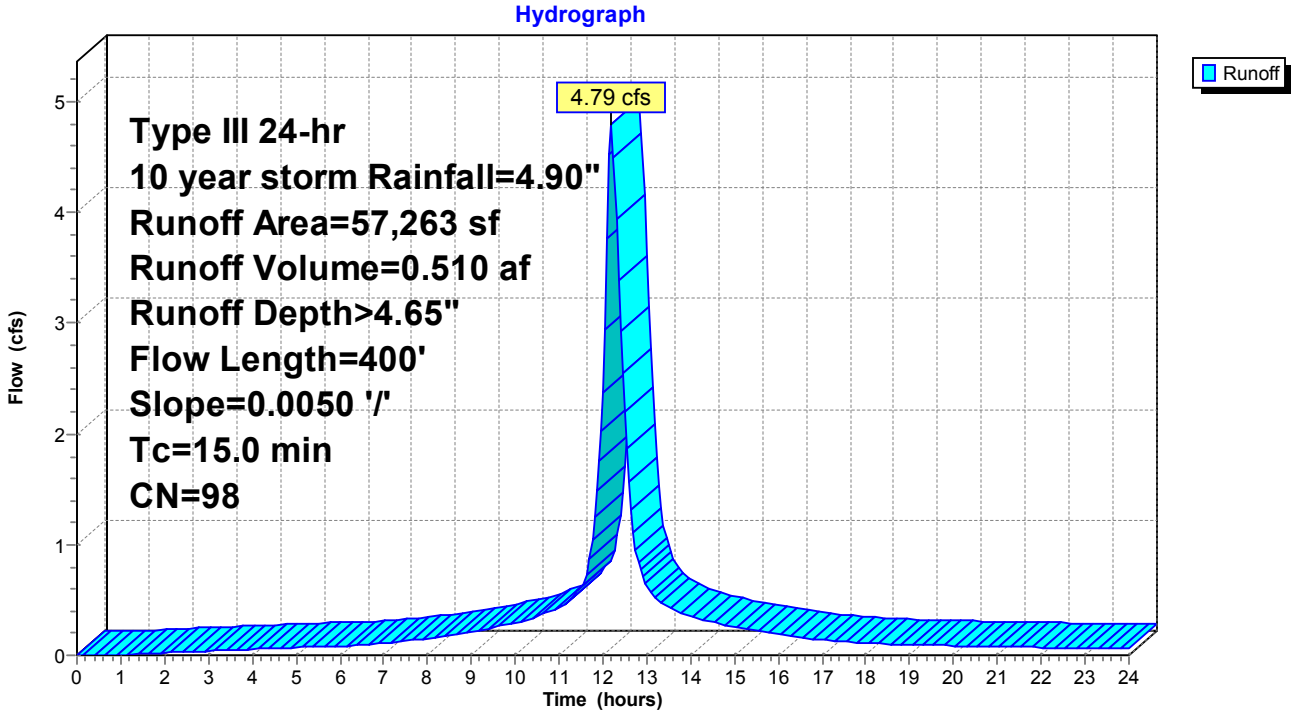
Runoff = 4.79 cfs @ 12.20 hrs, Volume= 0.510 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
57,263	98	Paved roads w/curbs & sewers, HSG A
57,263		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	200	0.0050	0.88		**Sheet Flow, Proposed Paved Surface Areaa** Smooth surfaces n= 0.011 P2= 3.00"
2.3	200	0.0050	1.44		**Shallow Concentrated Flow, Proposed Paved Surface Area** Paved Kv= 20.3 fps
6.1	400	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin



Summary for Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 6.54 cfs @ 12.20 hrs, Volume= 0.696 af
Outflow = 0.38 cfs @ 14.77 hrs, Volume= 0.417 af, Atten= 94%, Lag= 154.0 min
Discarded = 0.38 cfs @ 14.77 hrs, Volume= 0.417 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.36' @ 14.77 hrs Surf.Area= 8,763 sf Storage= 18,769 cf

Plug-Flow detention time= 350.3 min calculated for 0.416 af (60% of inflow)
Center-of-Mass det. time= 241.0 min (996.4 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	70.50'	35,623 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

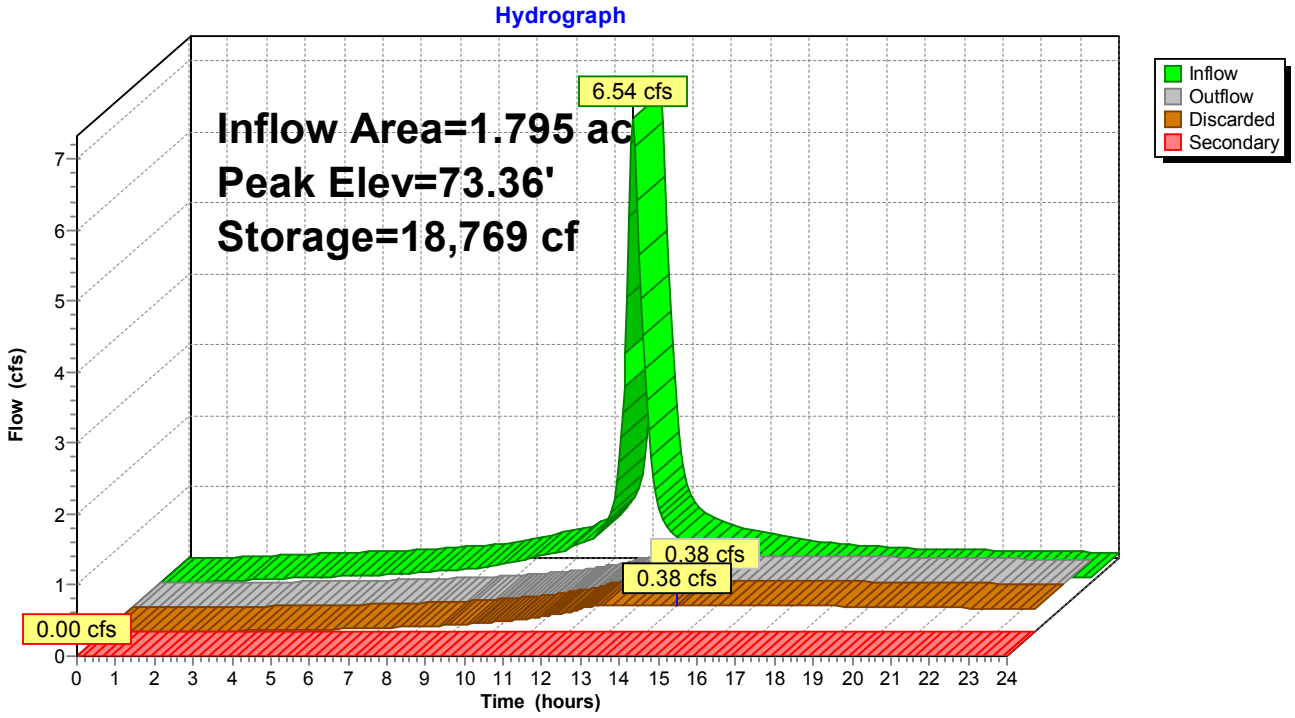
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.50	4,780	0	0
71.00	5,240	2,505	2,505
72.00	6,535	5,888	8,393
73.00	8,145	7,340	15,733
74.00	9,865	9,005	24,738
75.00	11,905	10,885	35,623

Device	Routing	Invert	Outlet Devices
#1	Discarded	70.50'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.50' Phase-In= 1.00'
#2	Secondary	73.50'	**8.0" Horiz. Orifice/Grate** C= 0.600 in 60.0" x 60.0" Grate (1% open area)

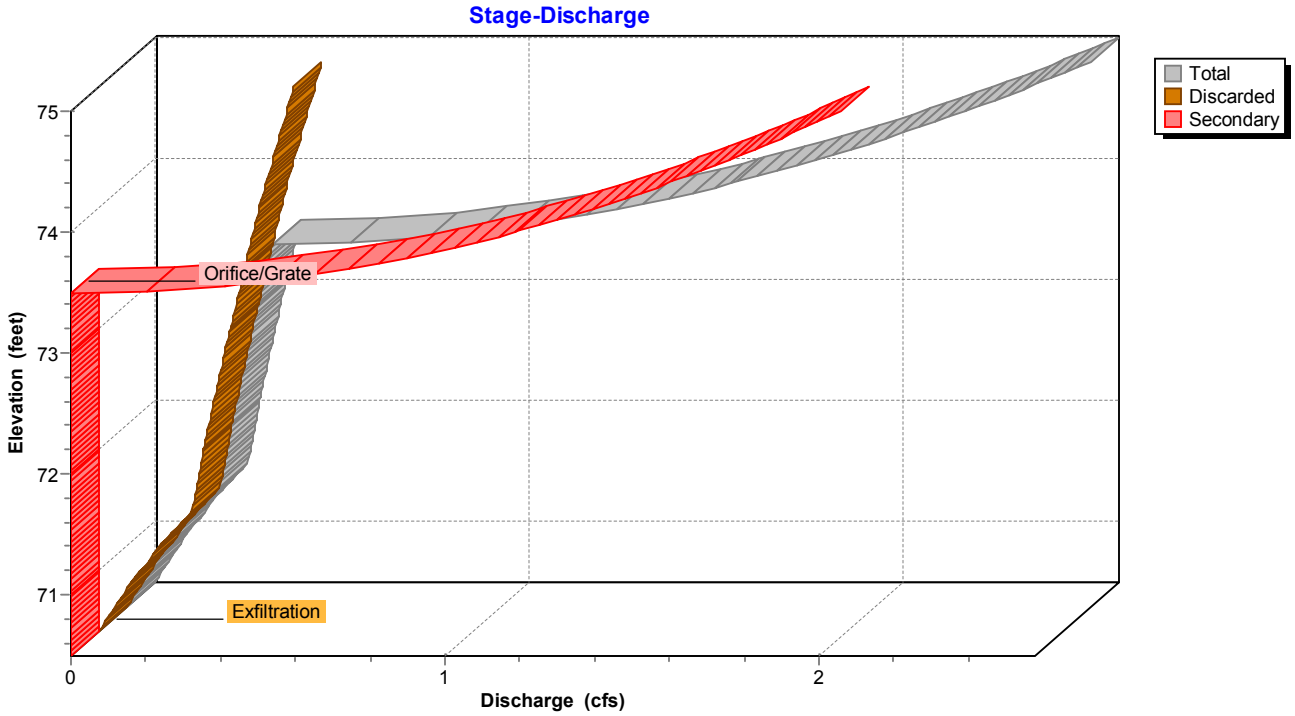
Discarded OutFlow Max=0.38 cfs @ 14.77 hrs HW=73.36' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.38 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=70.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

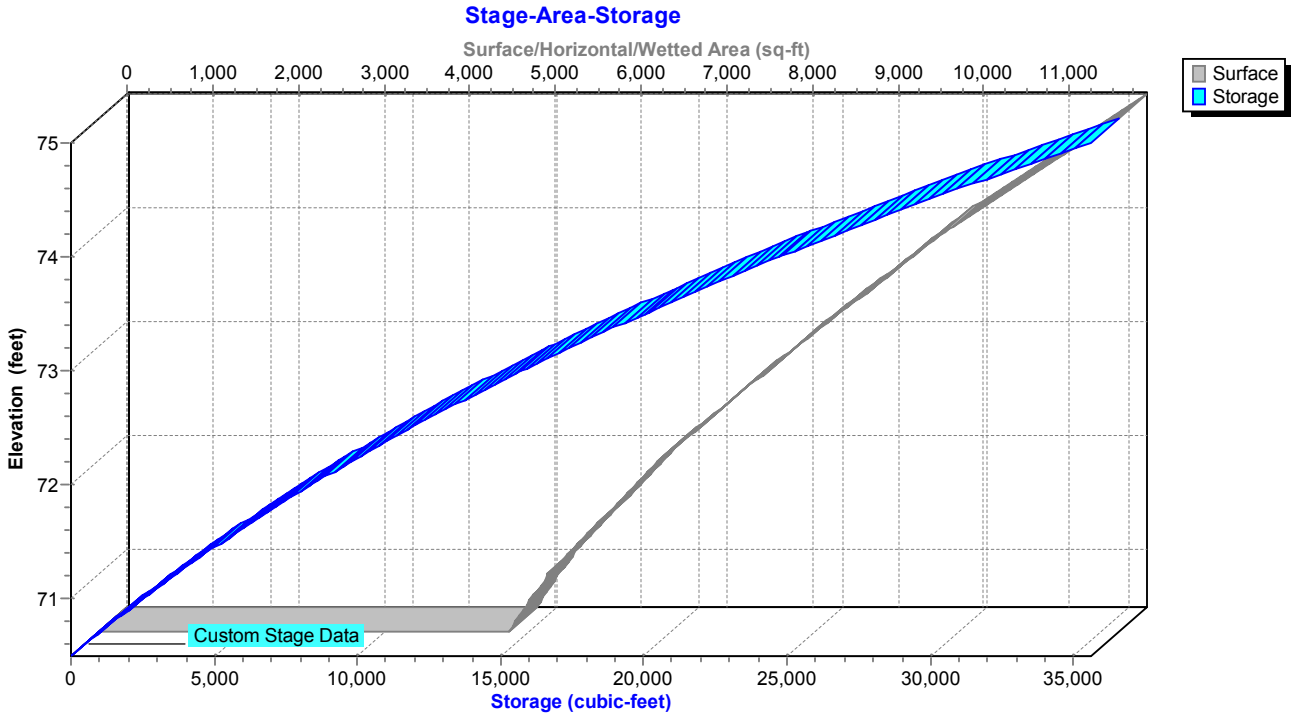
Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Summary for Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2

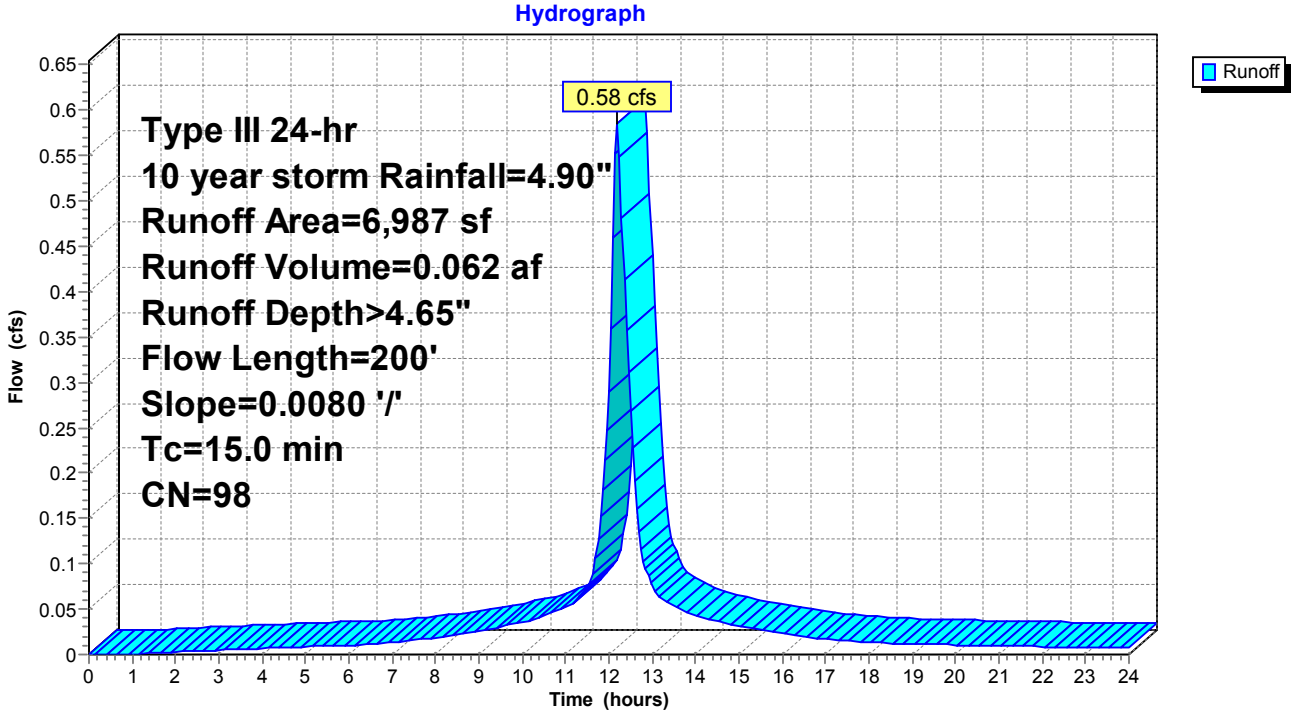
Runoff = 0.58 cfs @ 12.20 hrs, Volume= 0.062 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
6,987	98	Paved parking, HSG A
6,987		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	200	0.0080	1.06		**Sheet Flow, New paved driveway to Kings HWY** Smooth surfaces n= 0.011 P2= 3.00"
3.1	200	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2


Hydrograph
Runoff
0.58 cfs
Type III 24-hr
10 year storm Rainfall=4.90"
Runoff Area=6,987 sf
Runoff Volume=0.062 af
Runoff Depth>4.65"
Flow Length=200'
Slope=0.0080 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

or Pond PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped

Inflow Area = 0.350 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 1.27 cfs @ 12.20 hrs, Volume= 0.136 af
Outflow = 0.27 cfs @ 12.73 hrs, Volume= 0.130 af, Atten= 79%, Lag= 31.8 min
Discarded = 0.27 cfs @ 12.73 hrs, Volume= 0.130 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.17' @ 12.73 hrs Surf.Area= 37,697 sf Storage= 2,575 cf

Plug-Flow detention time= 153.6 min calculated for 0.130 af (96% of inflow)
Center-of-Mass det. time= 129.1 min (884.5 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	90,473 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 226,182 cf Overall x 40.0% Voids

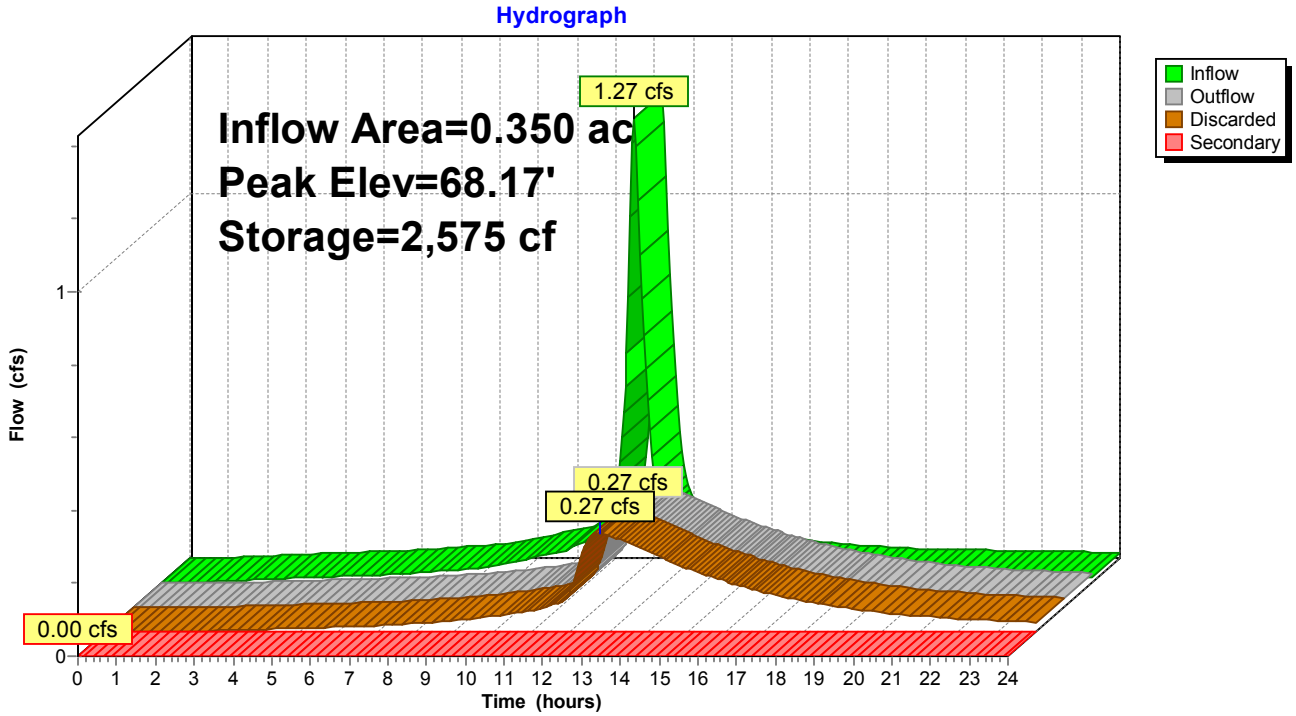
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.00	37,697	0	0
69.00	37,697	37,697	37,697
70.00	37,697	37,697	75,394
71.00	37,697	37,697	113,091
72.00	37,697	37,697	150,788
73.00	37,697	37,697	188,485
74.00	37,697	37,697	226,182

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.00' Phase-In= 1.00'
#2	Secondary	73.50'	**18.0" Round Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 73.50' / 73.20' S= 0.0030 '/' Cc= 0.900 n= 0.014 Steel, smooth, Flow Area= 1.77 sf

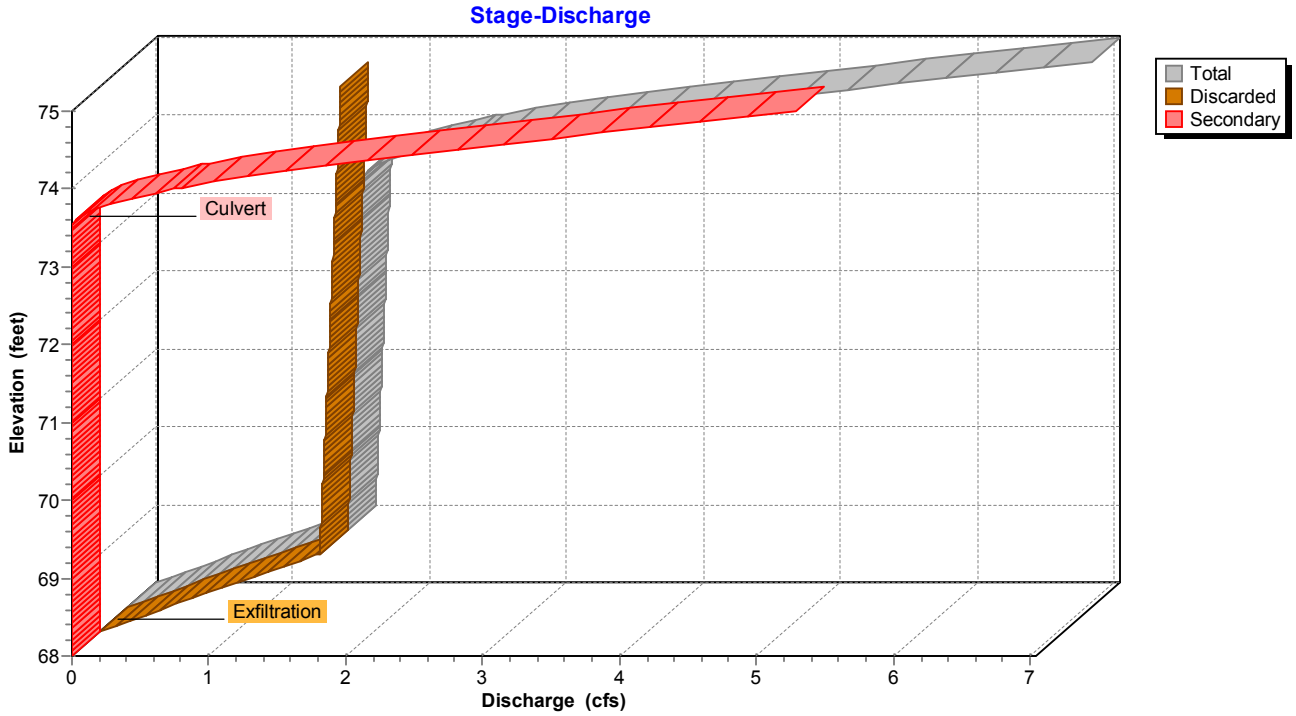
Discarded OutFlow Max=0.27 cfs @ 12.73 hrs HW=68.17' (Free Discharge)
1=Exfiltration (Controls 0.27 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.00' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

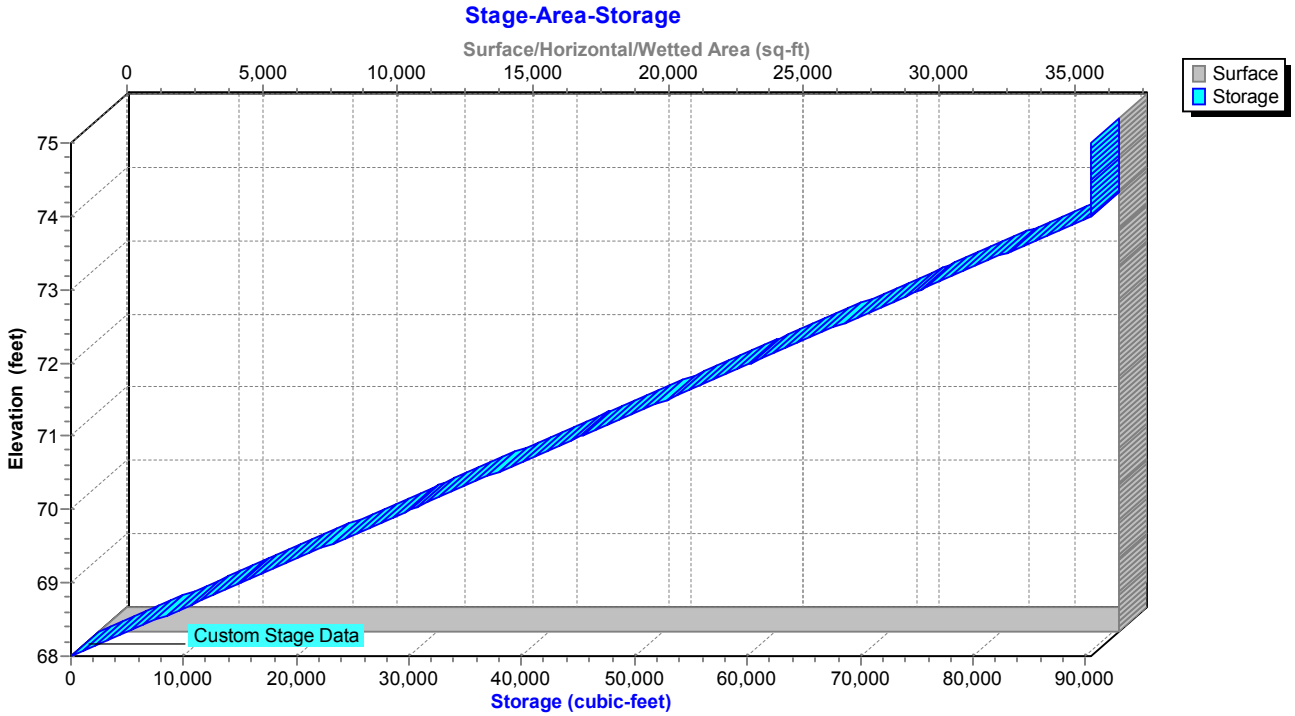
d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



Summary for Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks

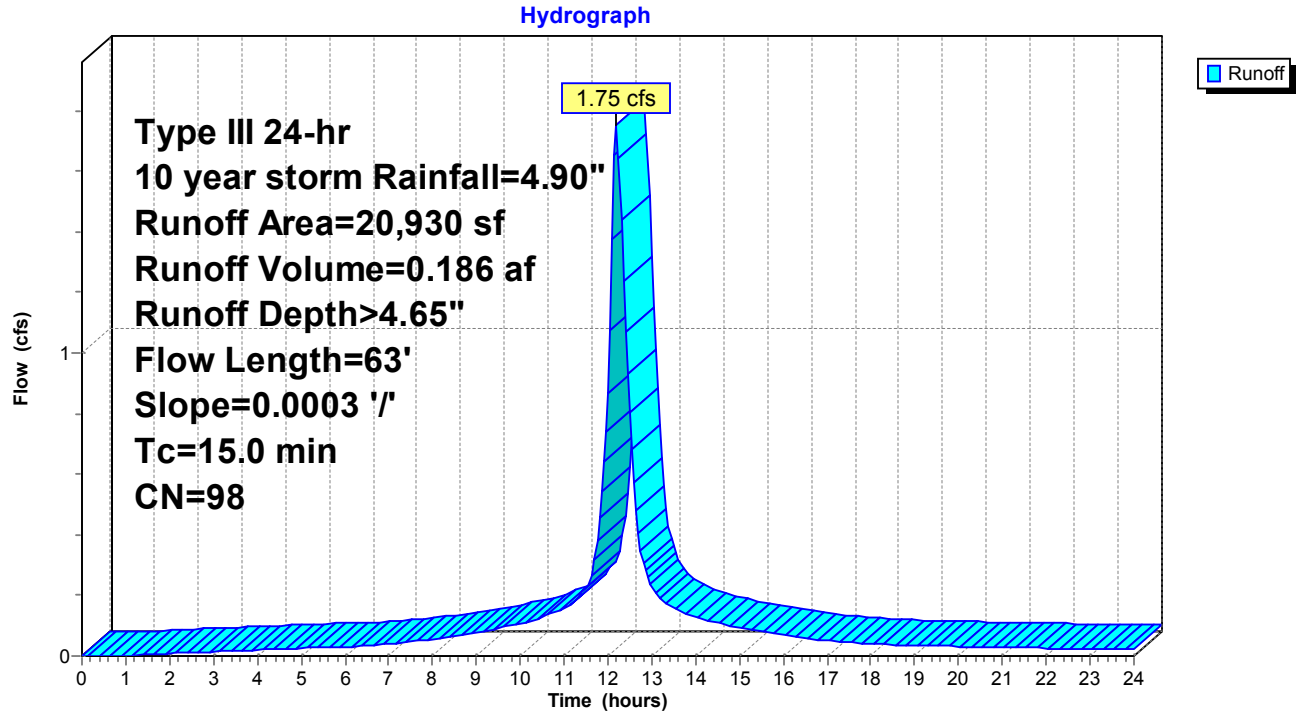
Runoff = 1.75 cfs @ 12.20 hrs, Volume= 0.186 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks



Summary for Pond W 1: Existing Wetland Area 1

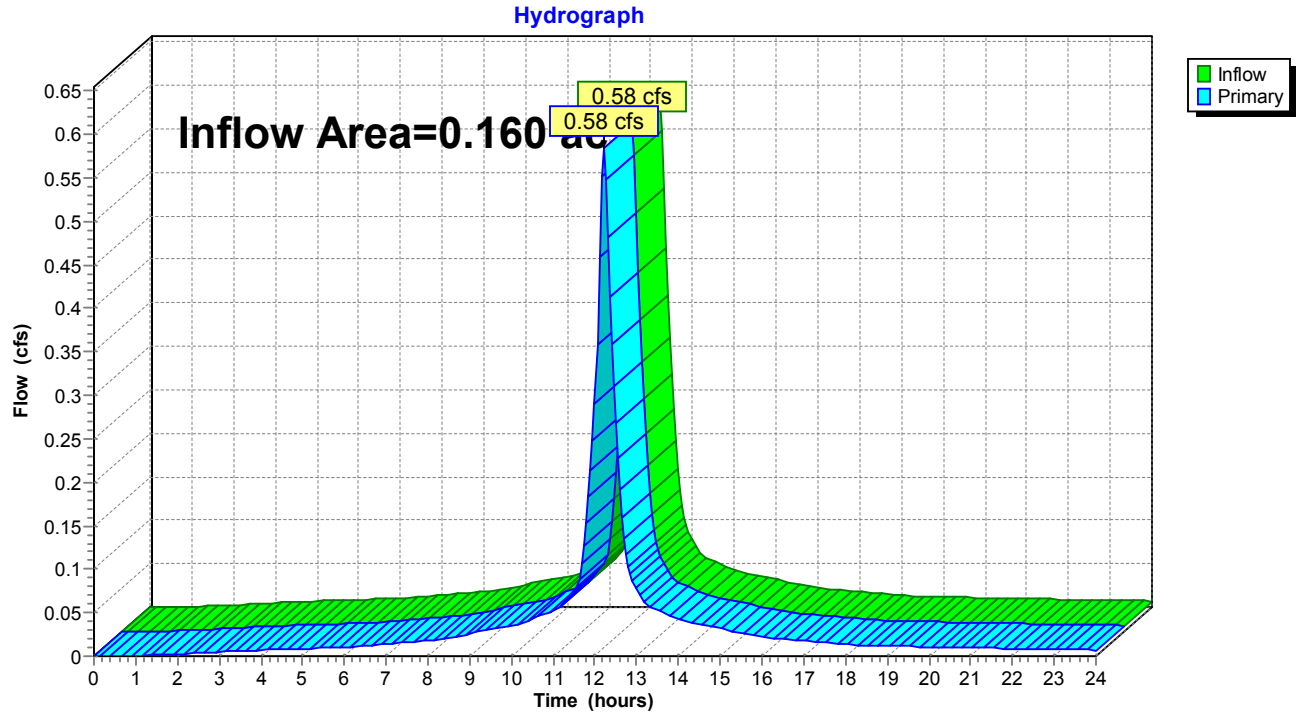
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.160 ac,100.00% Impervious, Inflow Depth > 4.65" for 10 year storm event
Inflow = 0.58 cfs @ 12.20 hrs, Volume= 0.062 af
Primary = 0.58 cfs @ 12.20 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2



Summary for Pond W 3: Existing Wetland Area 3

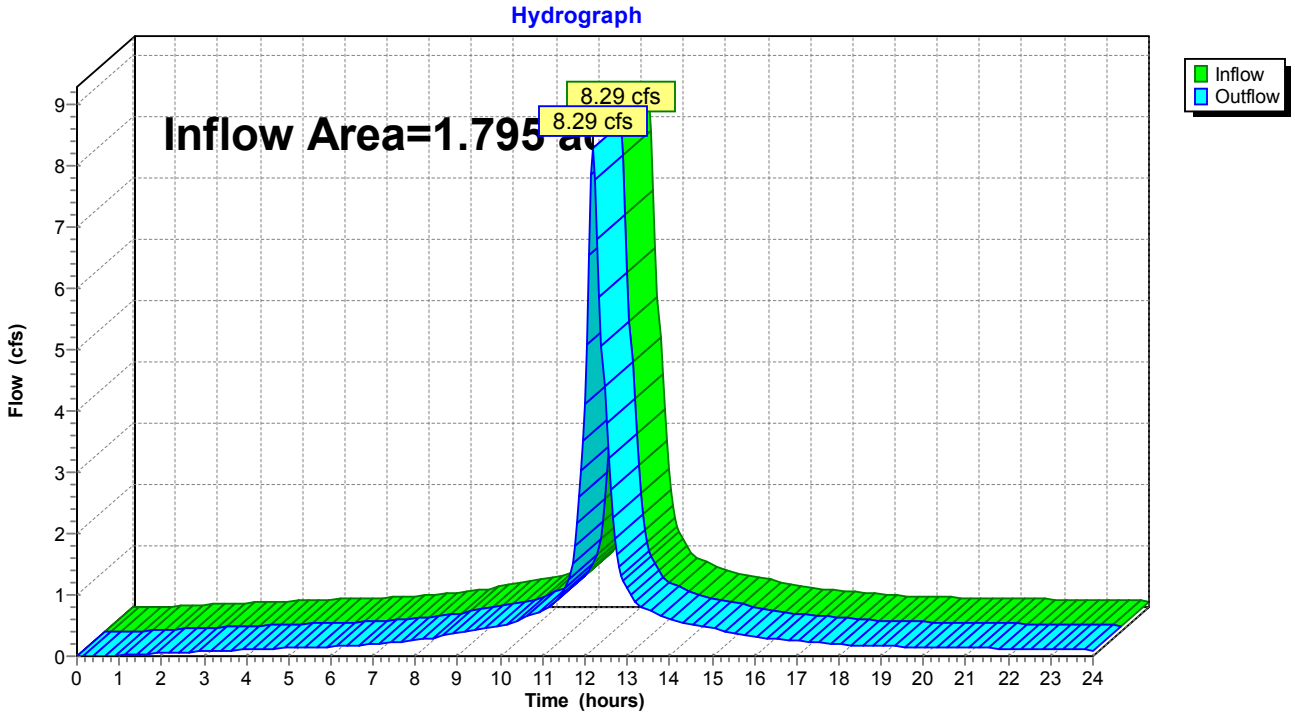
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

...ary for Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 8.29 cfs @ 12.20 hrs, Volume= 0.890 af
Outflow = 8.29 cfs @ 12.20 hrs, Volume= 0.890 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention Basin

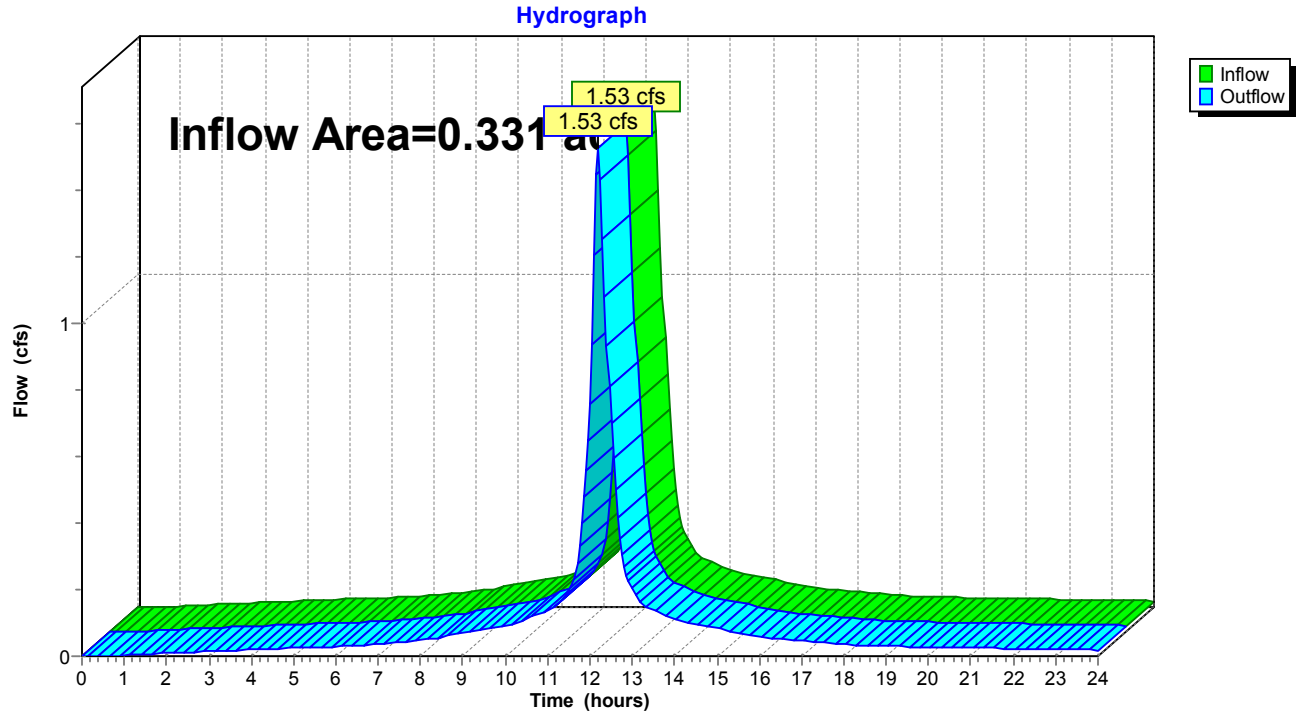


Summary for Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af
Outflow = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

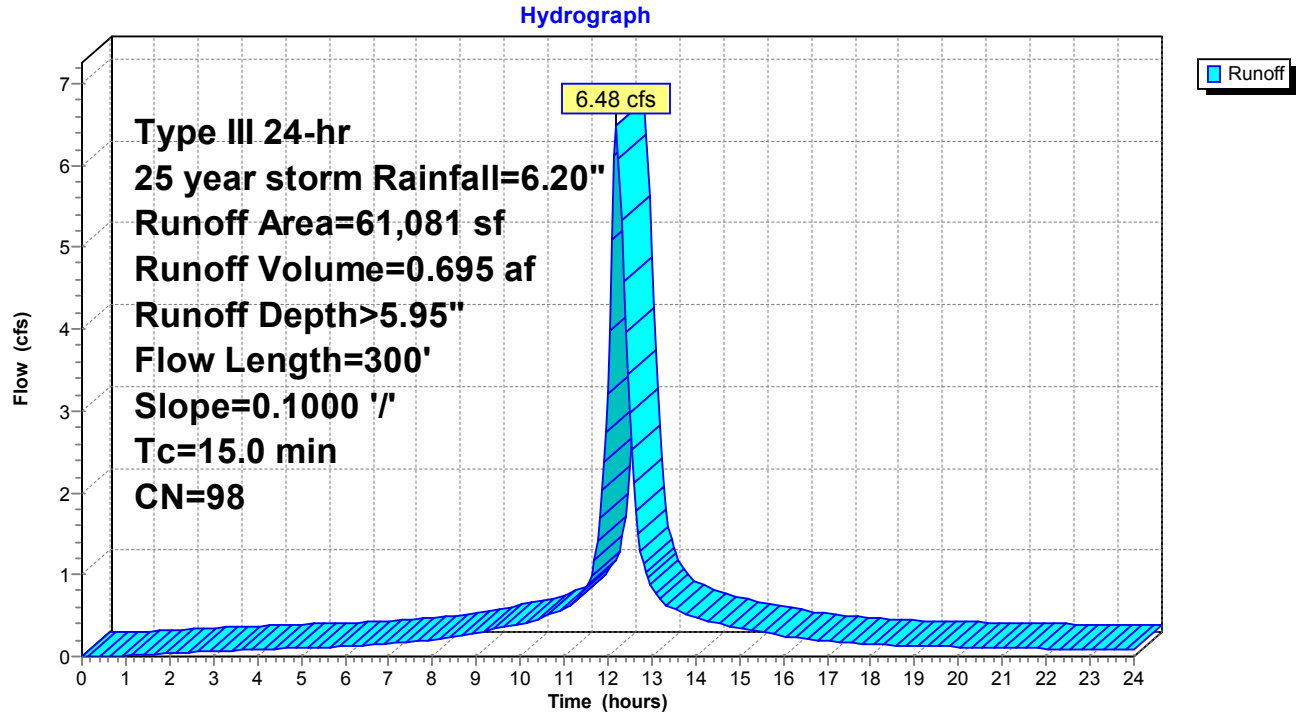
Runoff = 6.48 cfs @ 12.20 hrs, Volume= 0.695 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
61,081	98	Roofs, HSG A
61,081		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale



Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

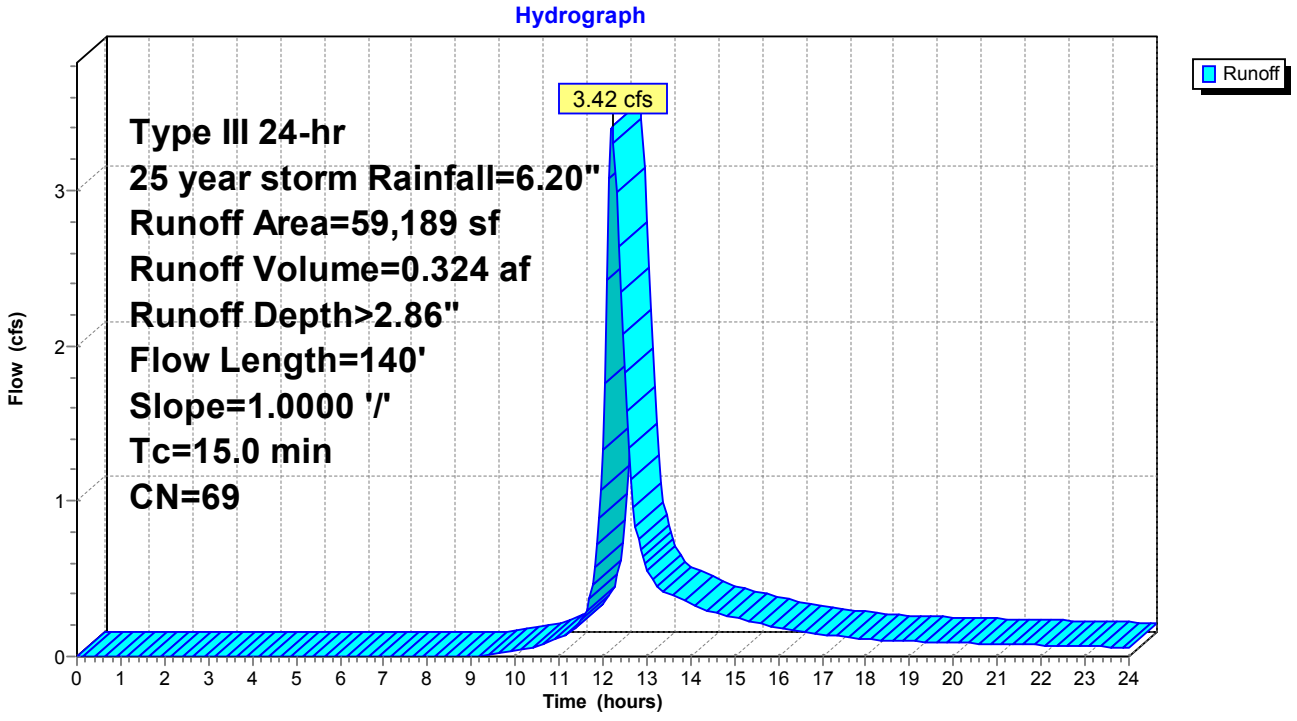
Runoff = 3.42 cfs @ 12.21 hrs, Volume= 0.324 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
59,189	69	50-75% Grass cover, Fair, HSG B
59,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

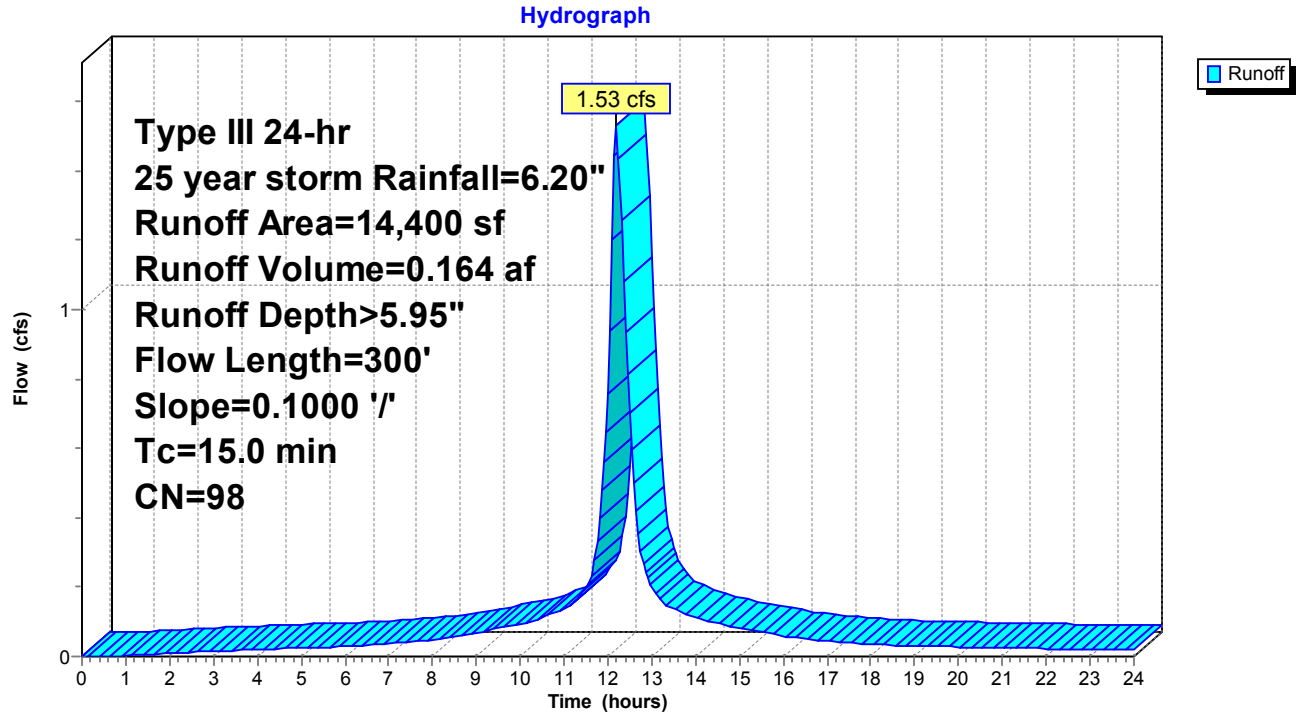
Runoff = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 1.53 cfs @ 12.20 hrs, Volume= 0.164 af
Outflow = 0.18 cfs @ 13.09 hrs, Volume= 0.135 af, Atten= 88%, Lag= 53.6 min
Discarded = 0.18 cfs @ 13.09 hrs, Volume= 0.135 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 72.09' @ 13.09 hrs Surf.Area= 4,212 sf Storage= 3,913 cf

Plug-Flow detention time= 279.2 min calculated for 0.135 af (82% of inflow)
Center-of-Mass det. time= 208.9 min (960.6 - 751.7)

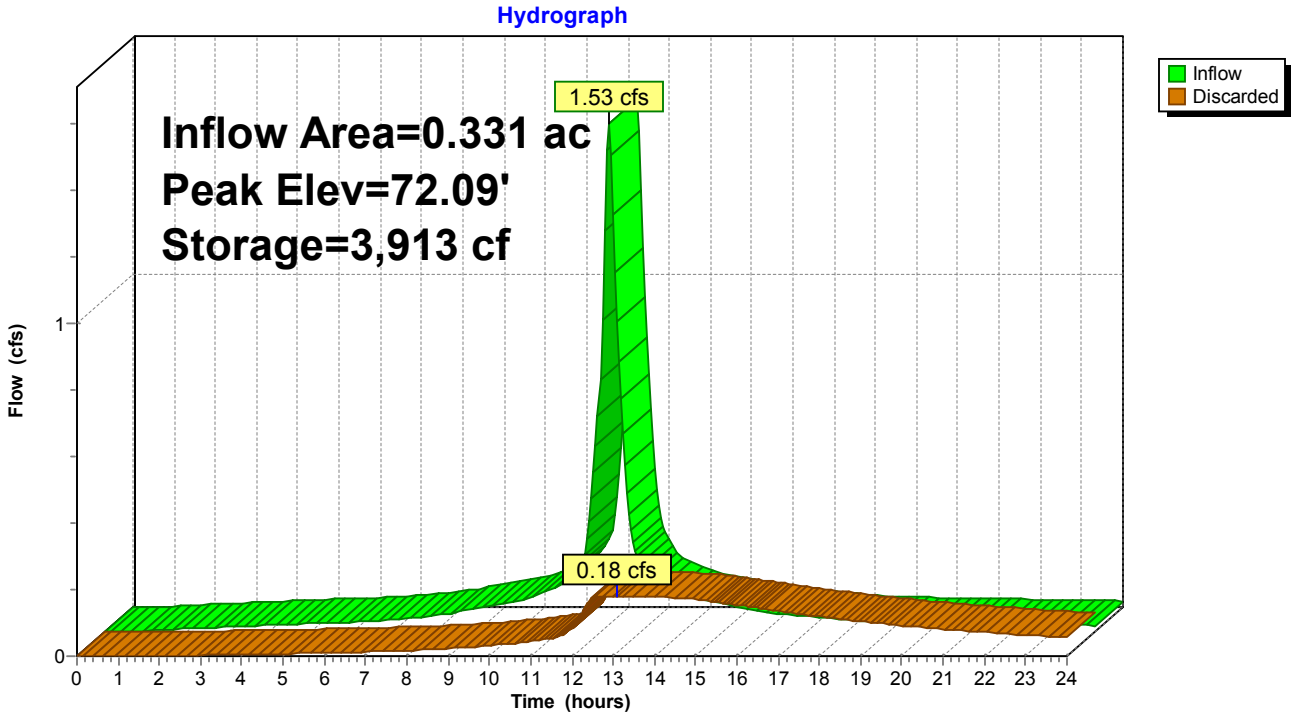
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	21,263 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,950	0	0
72.00	4,100	3,525	3,525
73.00	5,300	4,700	8,225
74.00	6,550	5,925	14,150
75.00	7,675	7,113	21,263

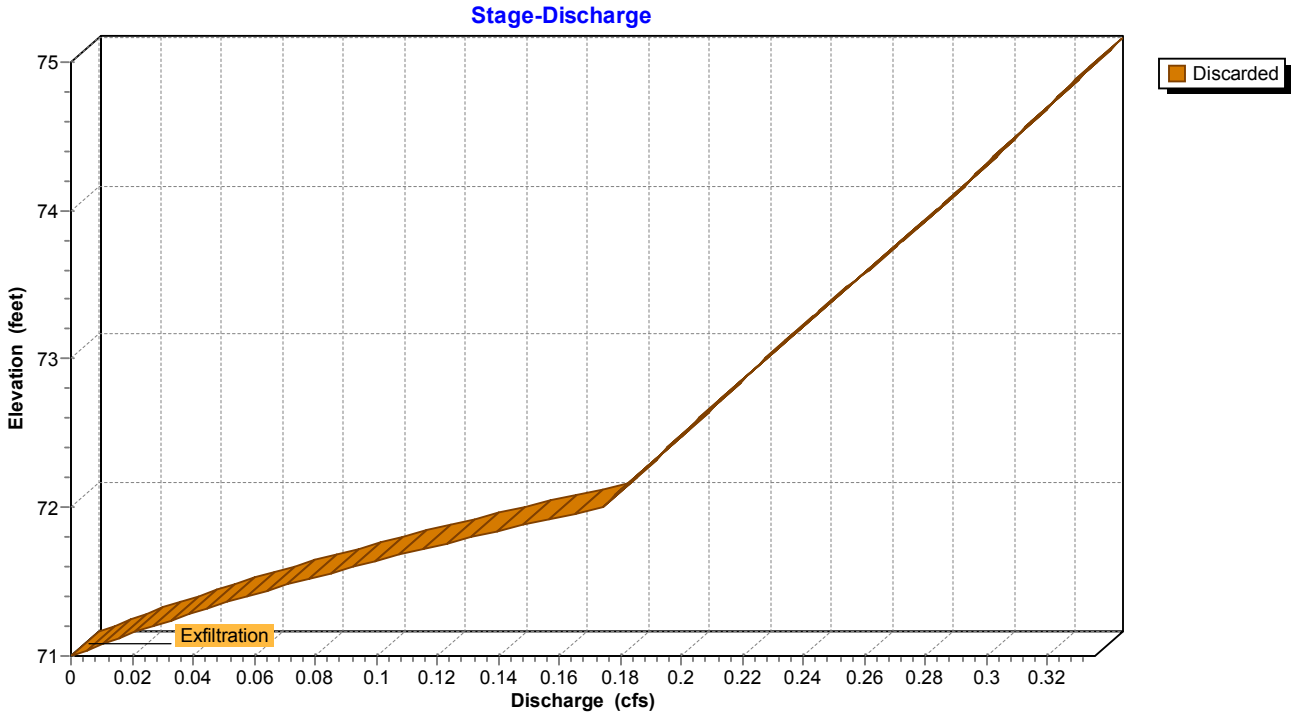
Device	Routing	Invert	Outlet Devices
#1	Discarded	71.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 8.00' Phase-In= 1.00'

Discarded OutFlow Max=0.18 cfs @ 13.09 hrs HW=72.09' (Free Discharge)
↑**1=Exfiltration** (Controls 0.18 cfs)

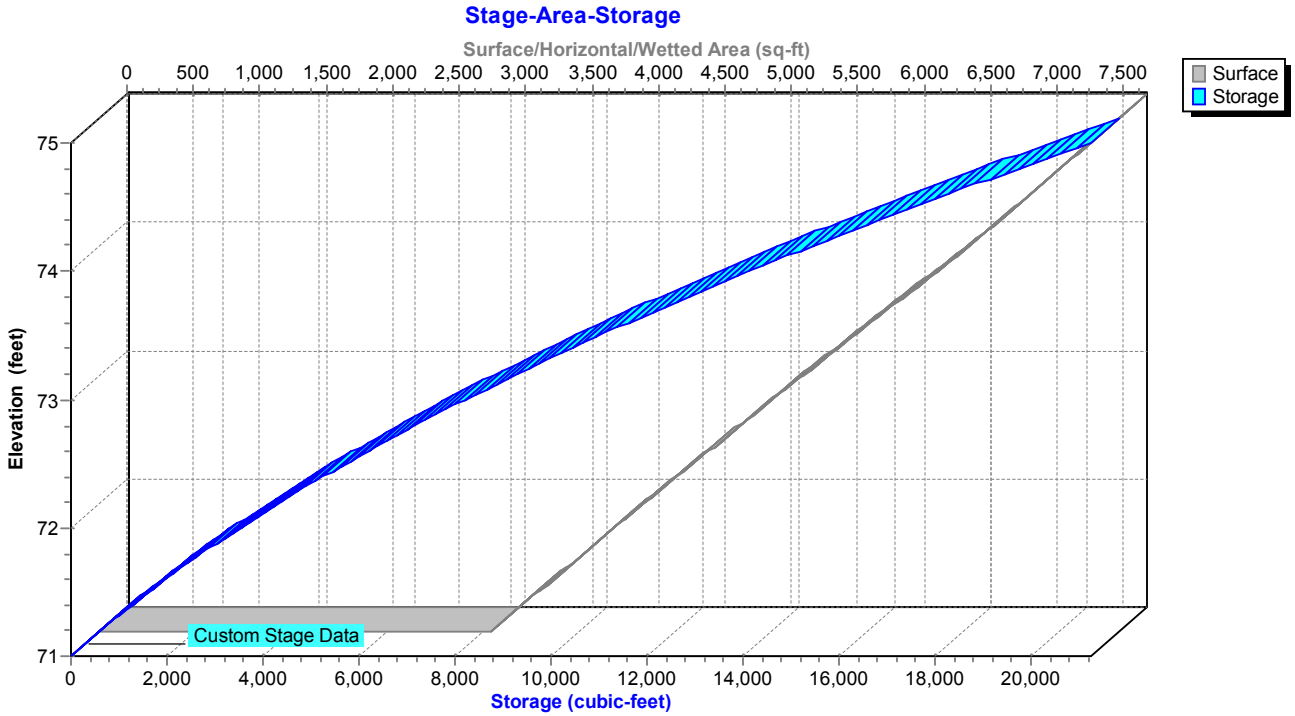
Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.79% Impervious, Inflow Depth > 4.43" for 25 year storm event
Inflow = 9.88 cfs @ 12.20 hrs, Volume= 1.019 af
Outflow = 3.38 cfs @ 12.61 hrs, Volume= 0.903 af, Atten= 66%, Lag= 24.4 min
Secondary = 3.38 cfs @ 12.61 hrs, Volume= 0.903 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.34' @ 12.61 hrs Surf.Area= 0.263 ac Storage= 0.414 af

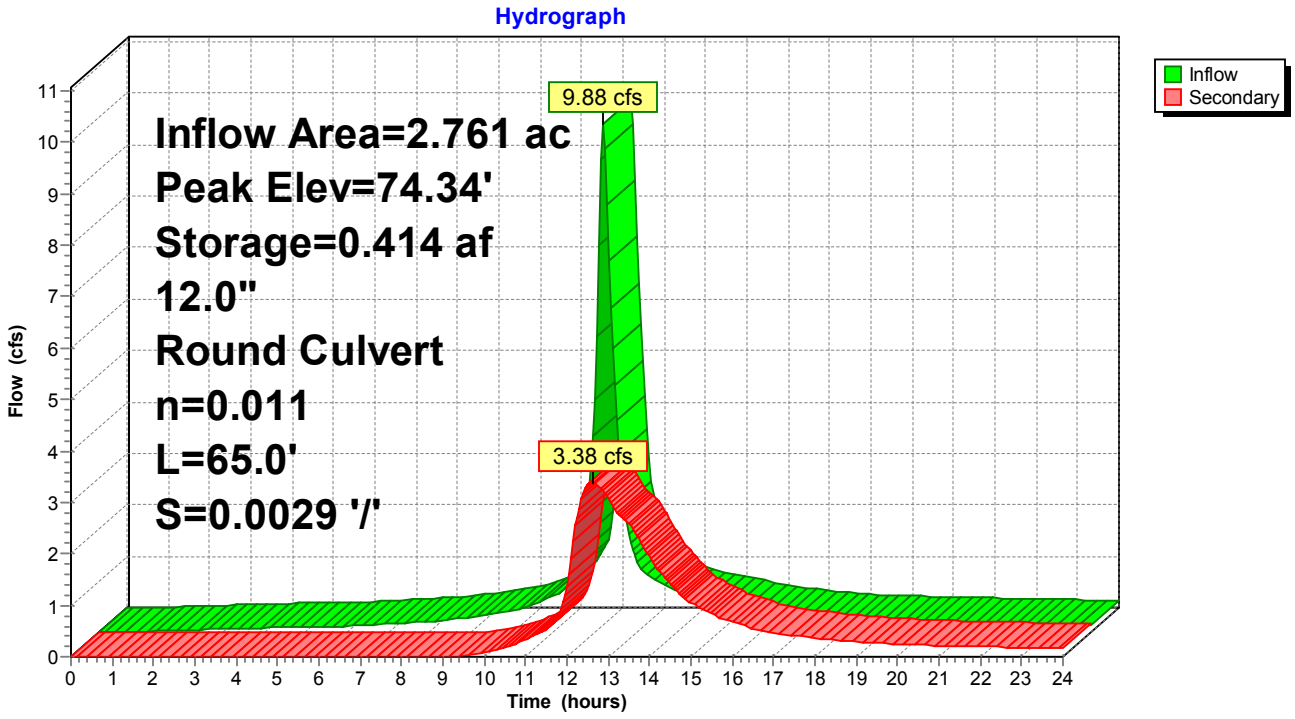
Plug-Flow detention time= 145.2 min calculated for 0.901 af (88% of inflow)
Center-of-Mass det. time= 91.7 min (873.2 - 781.5)

Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

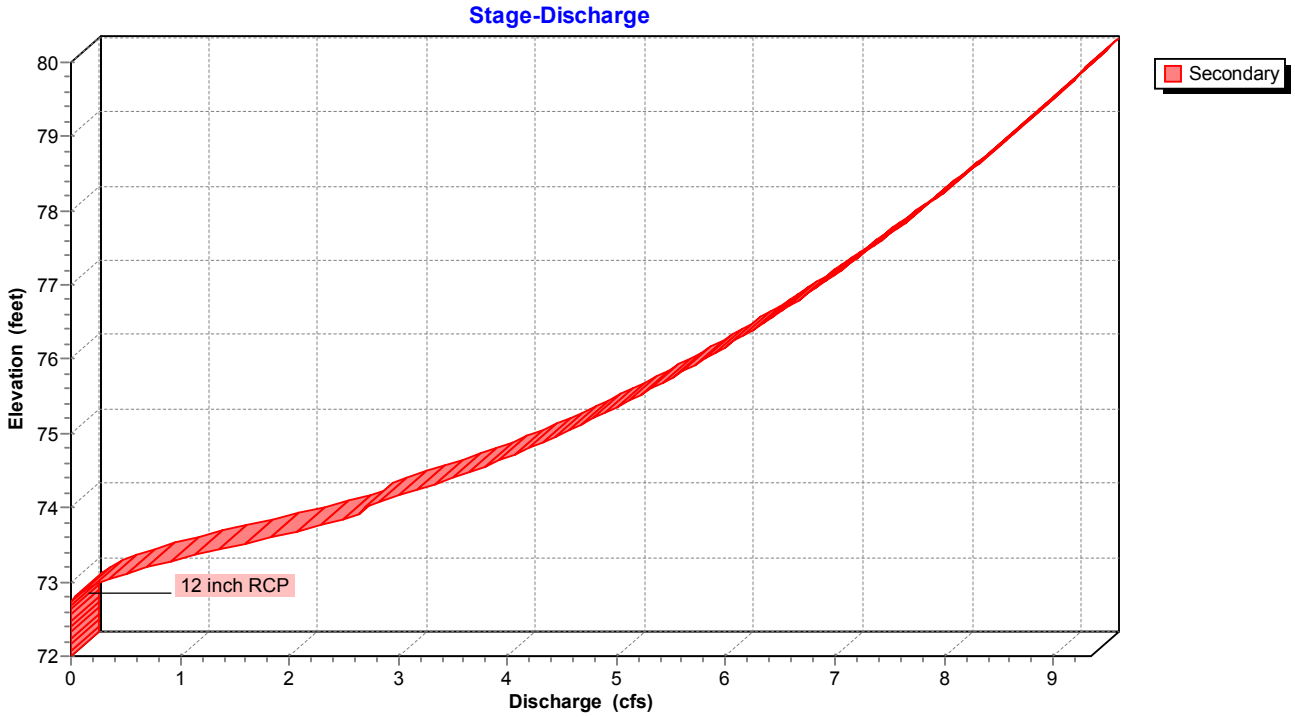
Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Secondary OutFlow Max=3.38 cfs @ 12.61 hrs HW=74.34' (Free Discharge)
1=12 inch RCP (Barrel Controls 3.38 cfs @ 4.30 fps)

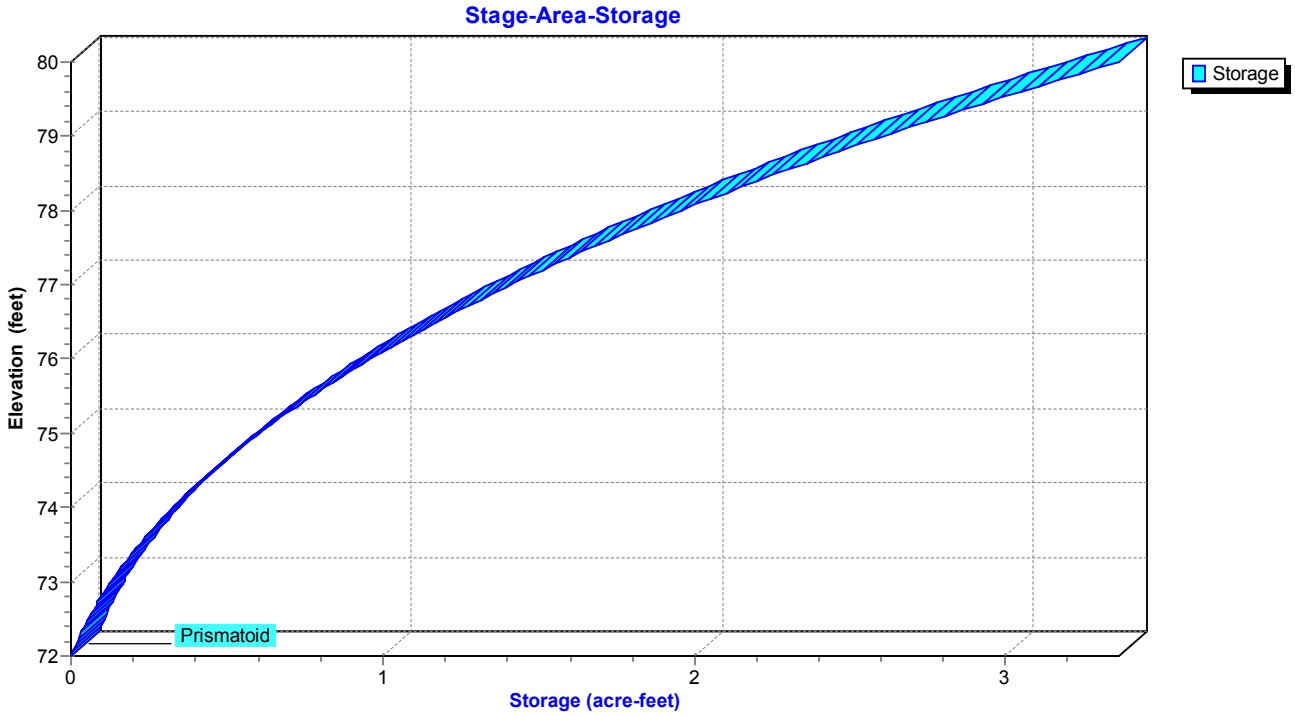
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



...ary for Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage

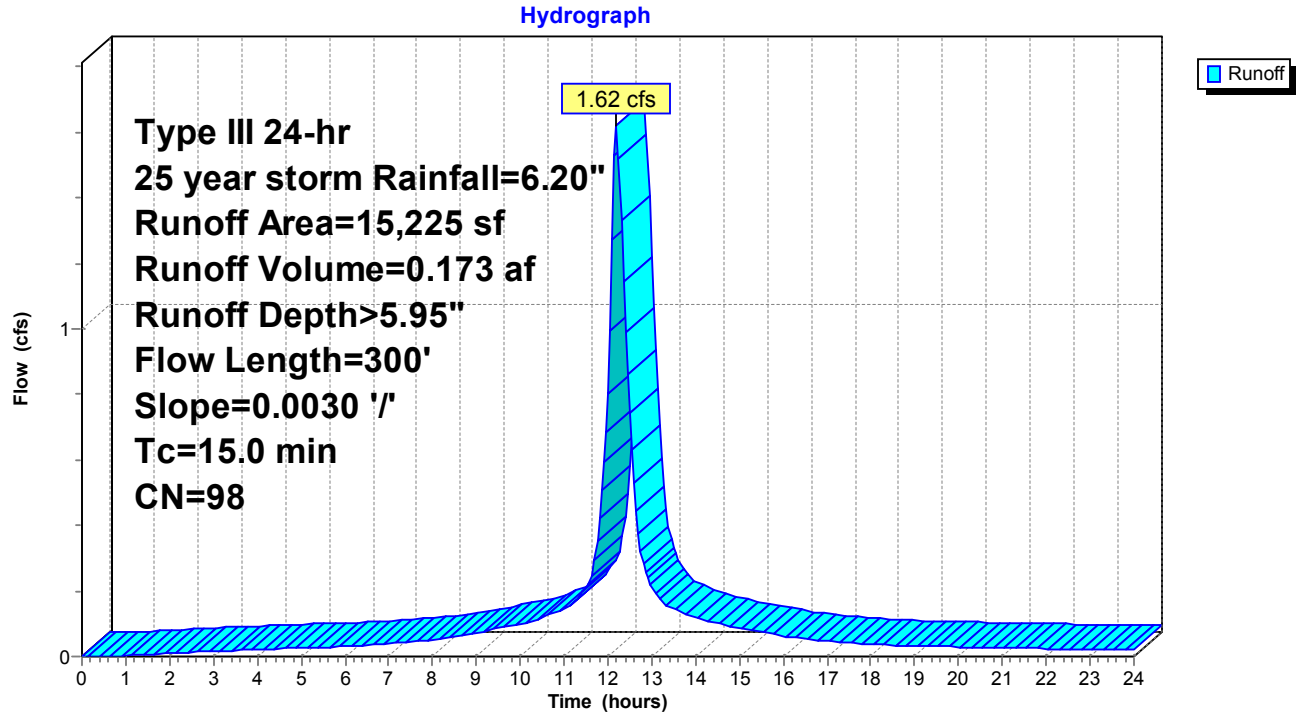
Runoff = 1.62 cfs @ 12.20 hrs, Volume= 0.173 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
15,225	98	Paved roads w/curbs & sewers, HSG A
15,225		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	300	0.0030	0.78		**Sheet Flow, overland runoff toward stone ballast areas** Smooth surfaces n= 0.011 P2= 3.00"
6.4	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage tracks



Summary for Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin

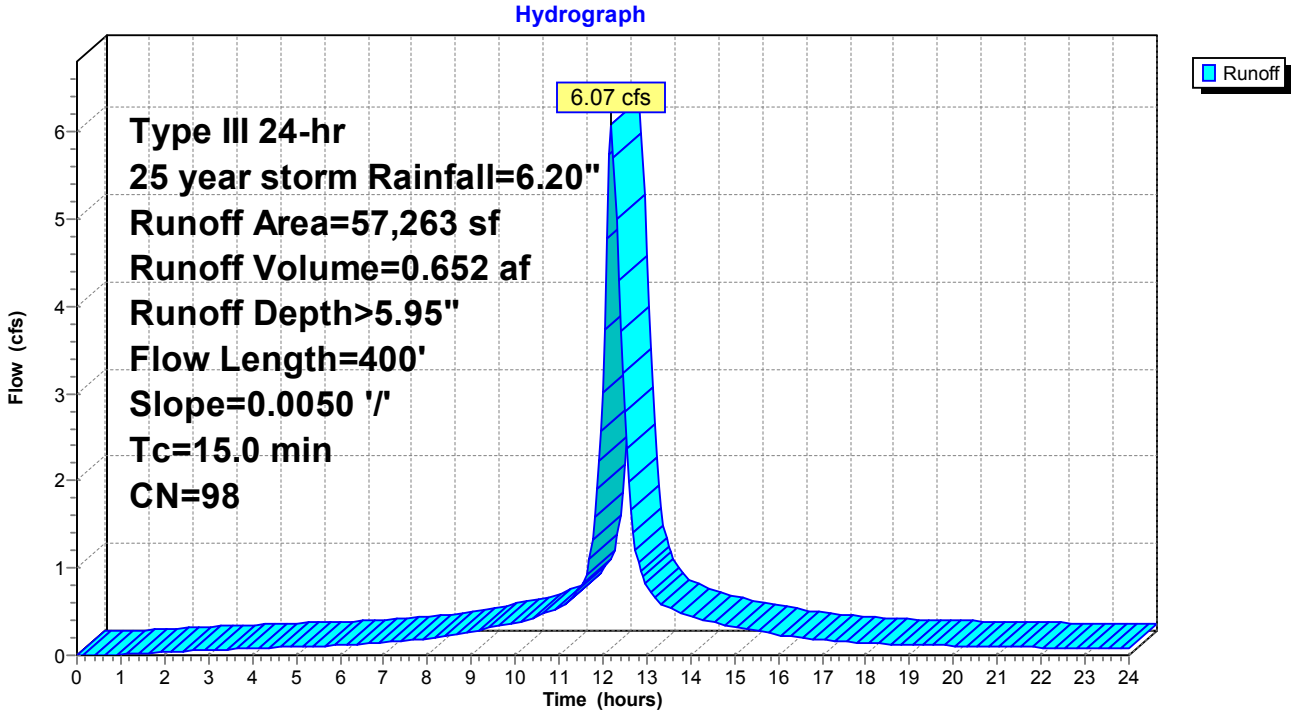
Runoff = 6.07 cfs @ 12.20 hrs, Volume= 0.652 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
57,263	98	Paved roads w/curbs & sewers, HSG A
57,263		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	200	0.0050	0.88		**Sheet Flow, Proposed Paved Surface Areaa** Smooth surfaces n= 0.011 P2= 3.00"
2.3	200	0.0050	1.44		**Shallow Concentrated Flow, Proposed Paved Surface Area** Paved Kv= 20.3 fps
6.1	400	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin



Summary for Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 8.29 cfs @ 12.20 hrs, Volume= 0.890 af
Outflow = 1.15 cfs @ 12.95 hrs, Volume= 0.565 af, Atten= 86%, Lag= 45.2 min
Discarded = 0.41 cfs @ 12.95 hrs, Volume= 0.454 af
Secondary = 0.74 cfs @ 12.95 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 73.70' @ 12.95 hrs Surf.Area= 9,342 sf Storage= 21,819 cf

Plug-Flow detention time= 300.1 min calculated for 0.565 af (63% of inflow)
Center-of-Mass det. time= 194.8 min (946.5 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1	70.50'	35,623 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

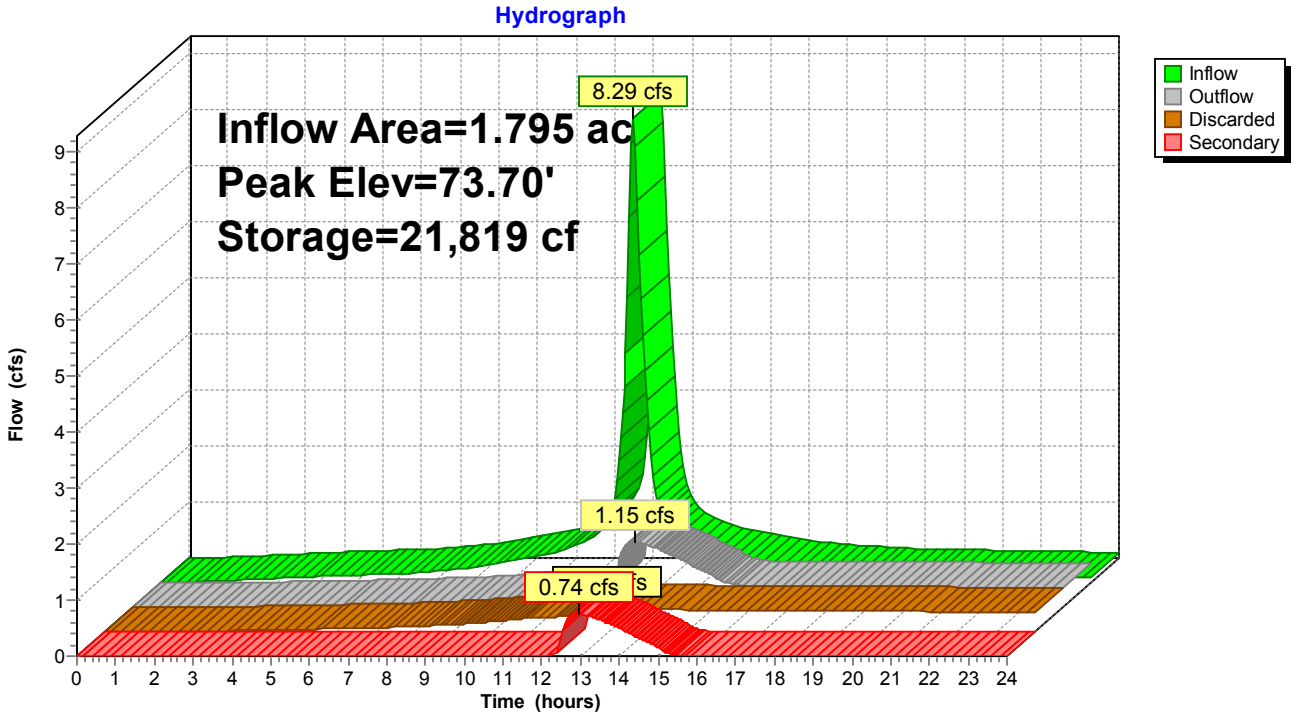
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.50	4,780	0	0
71.00	5,240	2,505	2,505
72.00	6,535	5,888	8,393
73.00	8,145	7,340	15,733
74.00	9,865	9,005	24,738
75.00	11,905	10,885	35,623

Device	Routing	Invert	Outlet Devices
#1	Discarded	70.50'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.50' Phase-In= 1.00'
#2	Secondary	73.50'	**8.0" Horiz. Orifice/Grate** C= 0.600 in 60.0" x 60.0" Grate (1% open area)

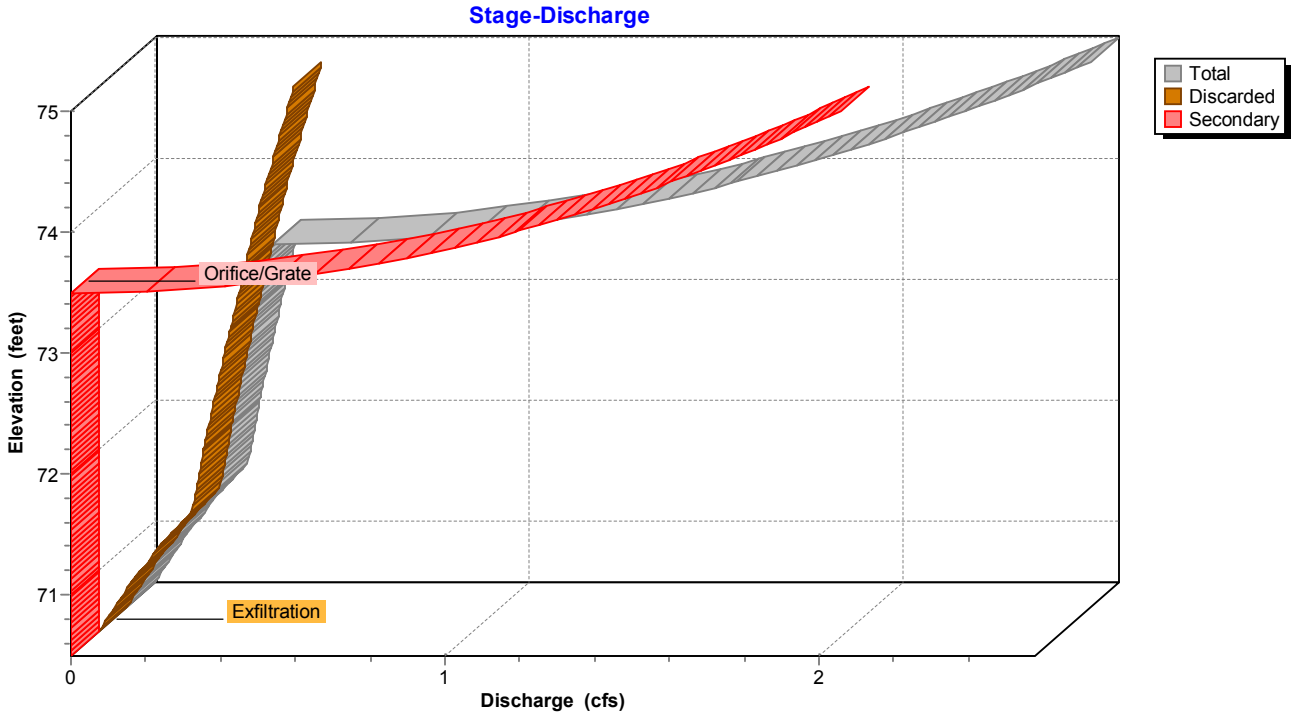
Discarded OutFlow Max=0.41 cfs @ 12.95 hrs HW=73.70' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.41 cfs)

Secondary OutFlow Max=0.74 cfs @ 12.95 hrs HW=73.70' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.74 cfs @ 2.13 fps)

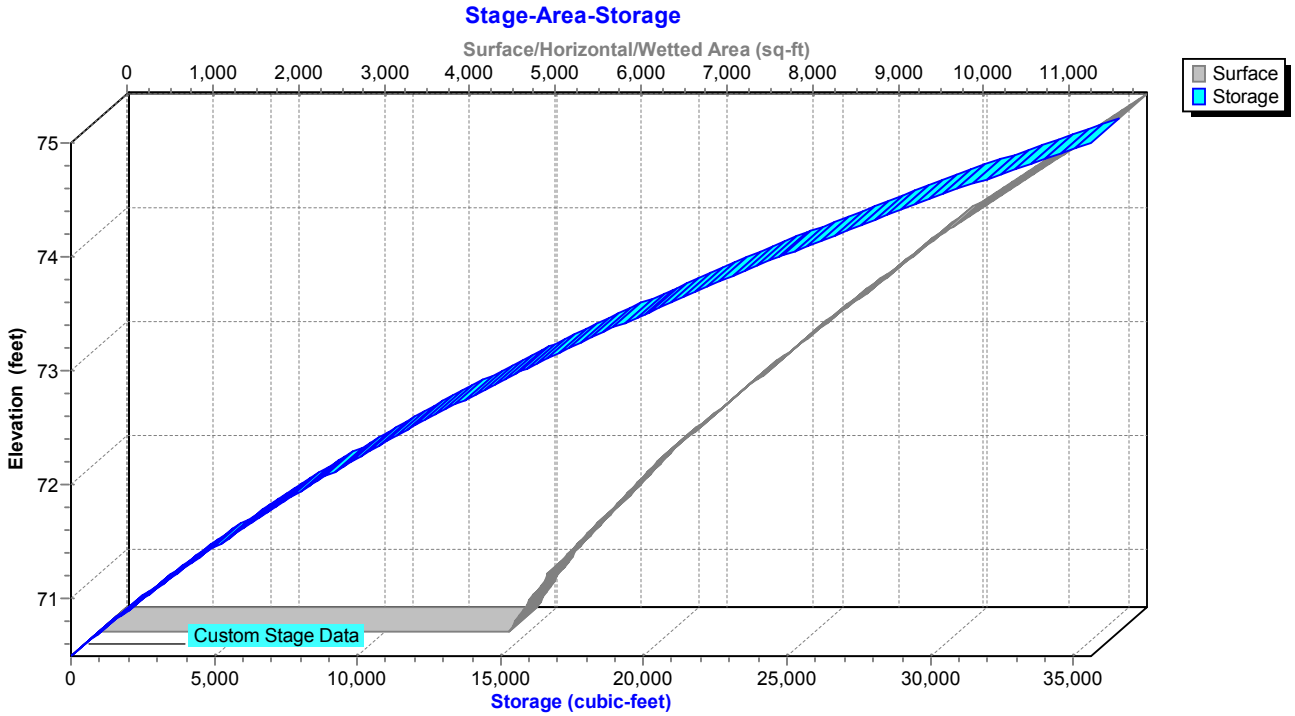
Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Summary for Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2

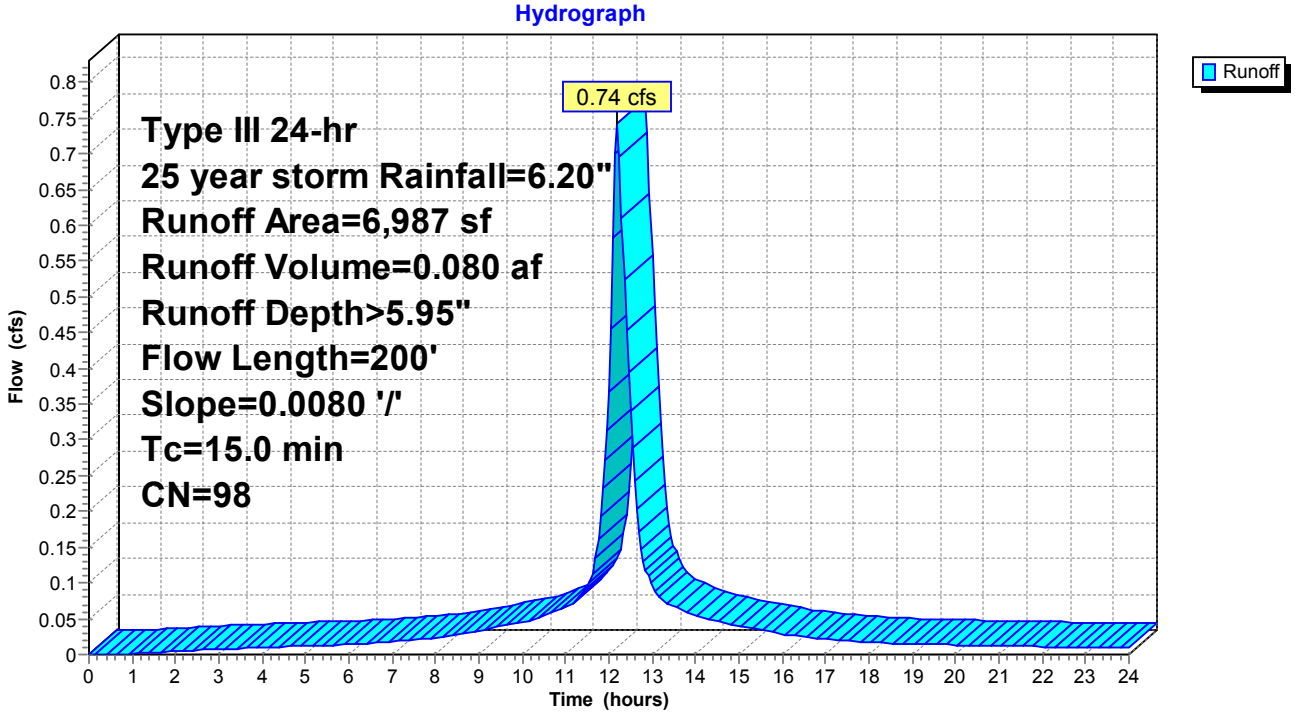
Runoff = 0.74 cfs @ 12.20 hrs, Volume= 0.080 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
6,987	98	Paved parking, HSG A
6,987		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	200	0.0080	1.06		**Sheet Flow, New paved driveway to Kings HWY** Smooth surfaces n= 0.011 P2= 3.00"
3.1	200	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2


Hydrograph
Runoff
0.74 cfs
Type III 24-hr
25 year storm Rainfall=6.20"
Runoff Area=6,987 sf
Runoff Volume=0.080 af
Runoff Depth>5.95"
Flow Length=200'
Slope=0.0080 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

or Pond PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped

Inflow Area = 0.350 ac,100.00% Impervious, Inflow Depth > 5.95" for 25 year storm event
Inflow = 1.62 cfs @ 12.20 hrs, Volume= 0.173 af
Outflow = 0.34 cfs @ 12.73 hrs, Volume= 0.166 af, Atten= 79%, Lag= 31.7 min
Discarded = 0.34 cfs @ 12.73 hrs, Volume= 0.166 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.22' @ 12.73 hrs Surf.Area= 37,697 sf Storage= 3,274 cf

Plug-Flow detention time= 153.6 min calculated for 0.166 af (96% of inflow)
Center-of-Mass det. time= 129.2 min (880.9 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	90,473 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 226,182 cf Overall x 40.0% Voids

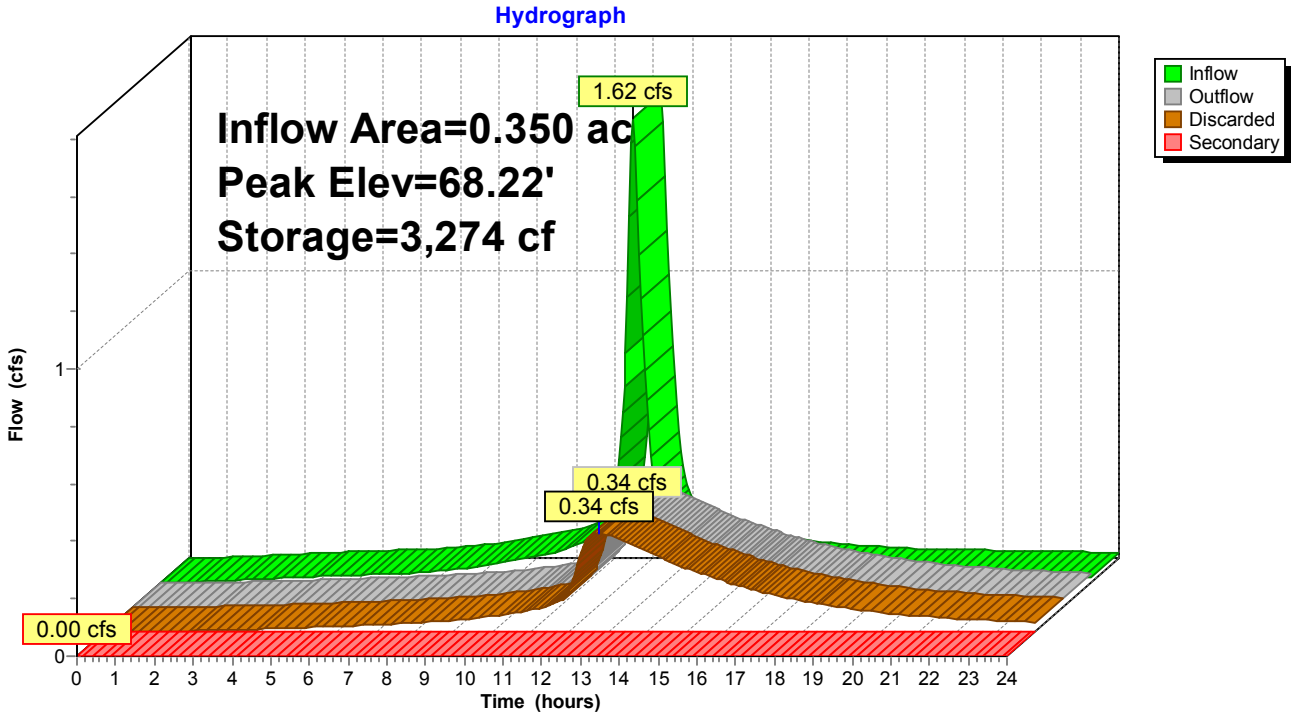
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.00	37,697	0	0
69.00	37,697	37,697	37,697
70.00	37,697	37,697	75,394
71.00	37,697	37,697	113,091
72.00	37,697	37,697	150,788
73.00	37,697	37,697	188,485
74.00	37,697	37,697	226,182

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.00' Phase-In= 1.00'
#2	Secondary	73.50'	**18.0" Round Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 73.50' / 73.20' S= 0.0030 '/' Cc= 0.900 n= 0.014 Steel, smooth, Flow Area= 1.77 sf

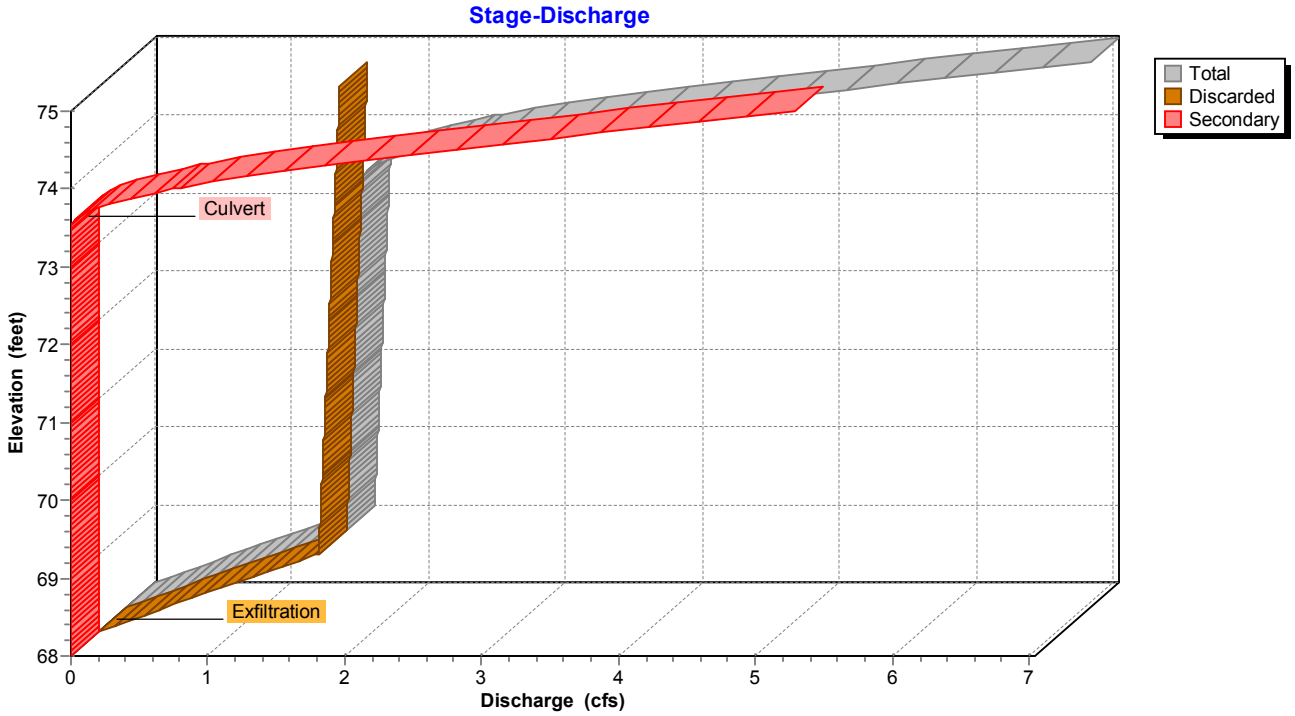
Discarded OutFlow Max=0.34 cfs @ 12.73 hrs HW=68.22' (Free Discharge)
1=Exfiltration (Controls 0.34 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.00' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

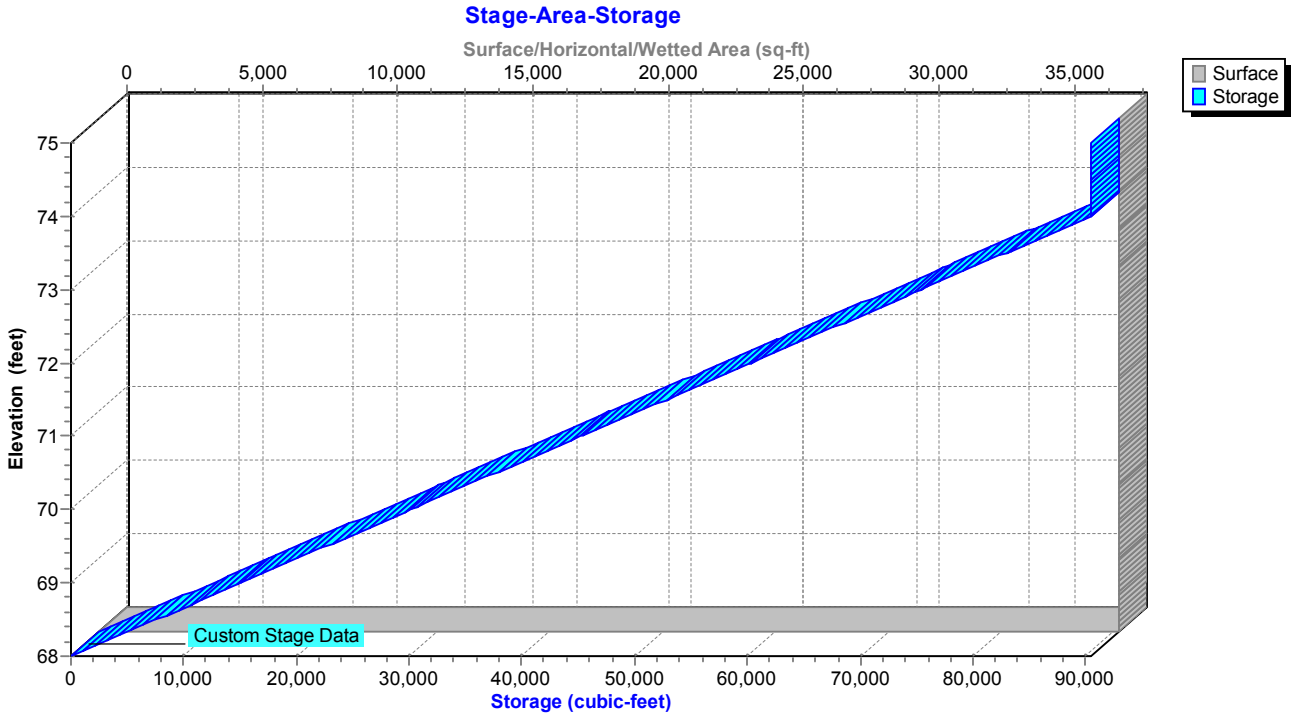
d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



Summary for Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks

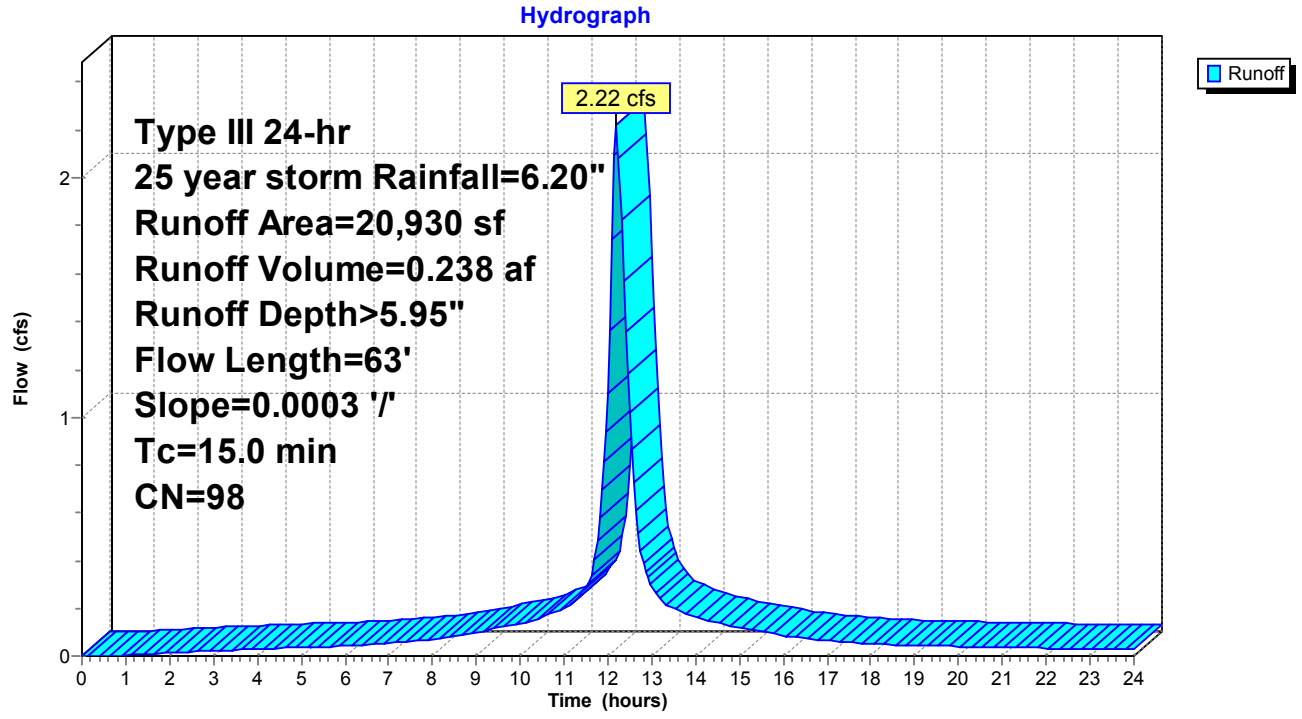
Runoff = 2.22 cfs @ 12.20 hrs, Volume= 0.238 af, Depth> 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks



Summary for Pond W 1: Existing Wetland Area 1

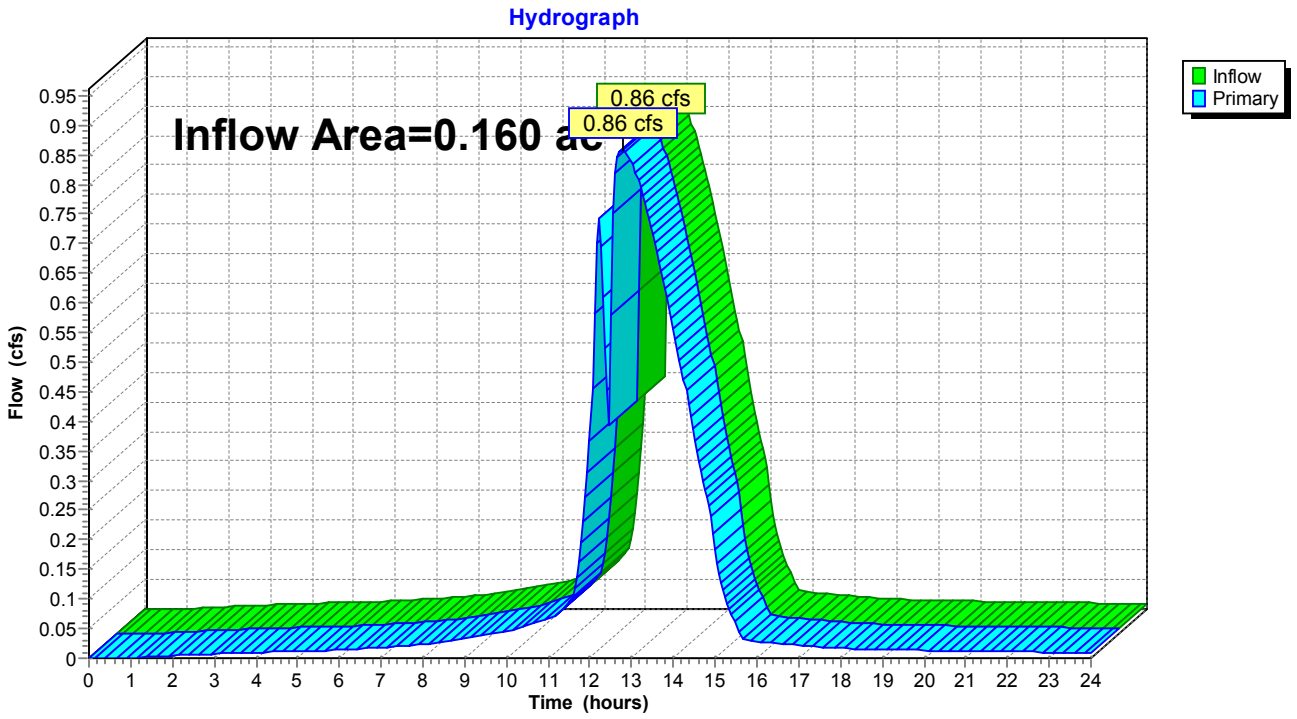
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.160 ac,100.00% Impervious, Inflow Depth > 14.22" for 25 year storm event
Inflow = 0.86 cfs @ 12.79 hrs, Volume= 0.190 af
Primary = 0.86 cfs @ 12.79 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2



Summary for Pond W 3: Existing Wetland Area 3

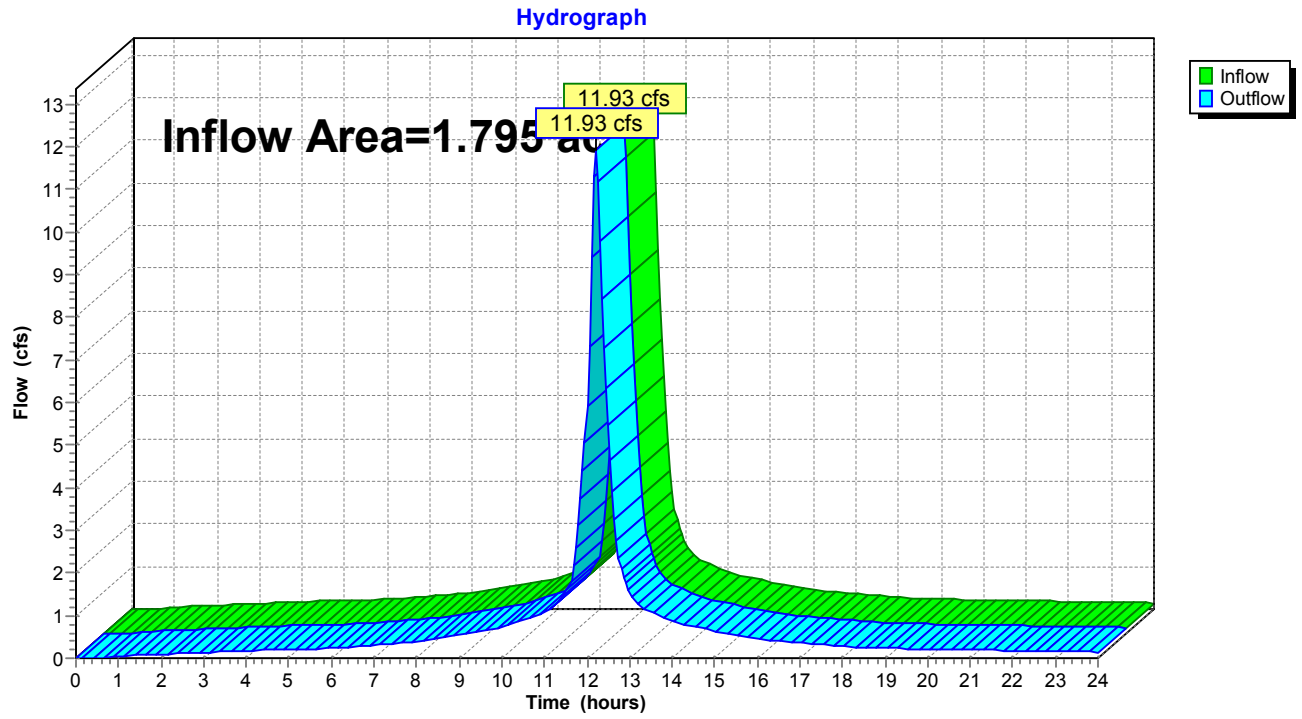
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

...ary for Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 11.93 cfs @ 12.20 hrs, Volume= 1.293 af
Outflow = 11.93 cfs @ 12.20 hrs, Volume= 1.293 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 12" PIPE: Proposed 12 inch RCP/DI collection pipe from NEW Paving Areas into New Detention Basin

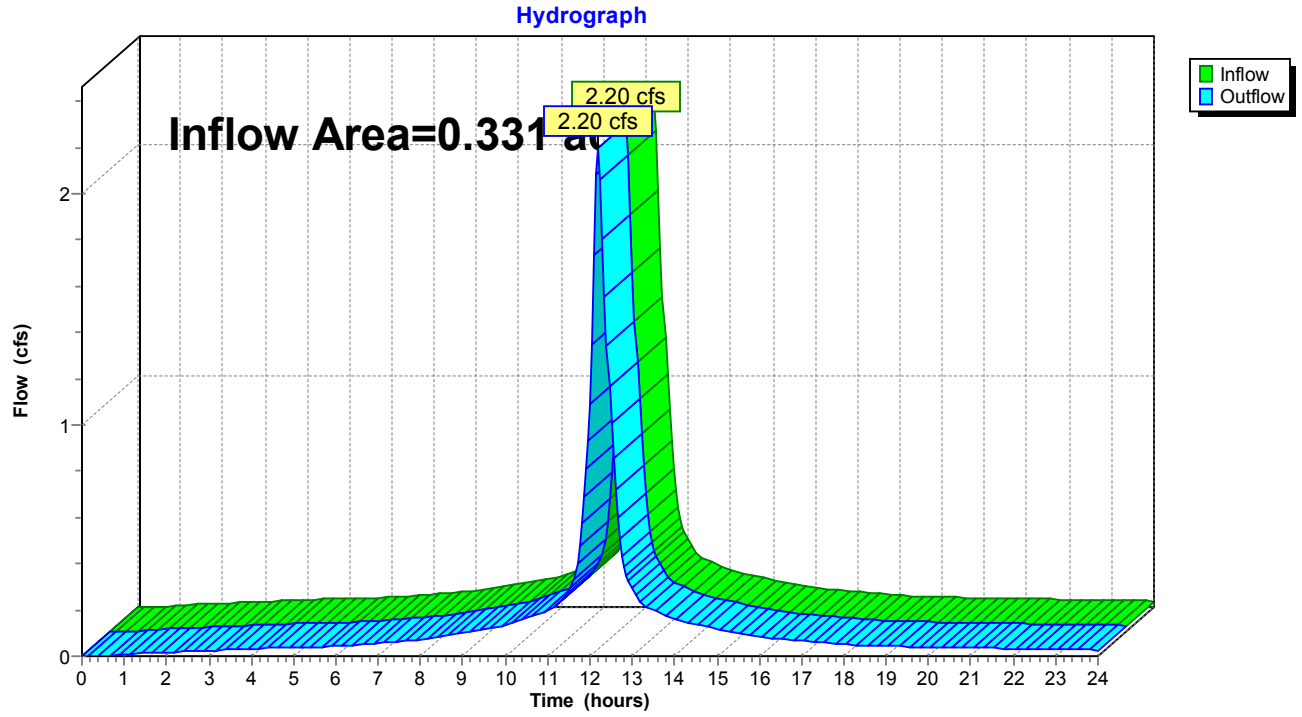


Summary for Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af
Outflow = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 18" PIPE: New 18 inch RCP/DI pipe from half roof drains into Enlarged Detention Basin



Summary for Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale

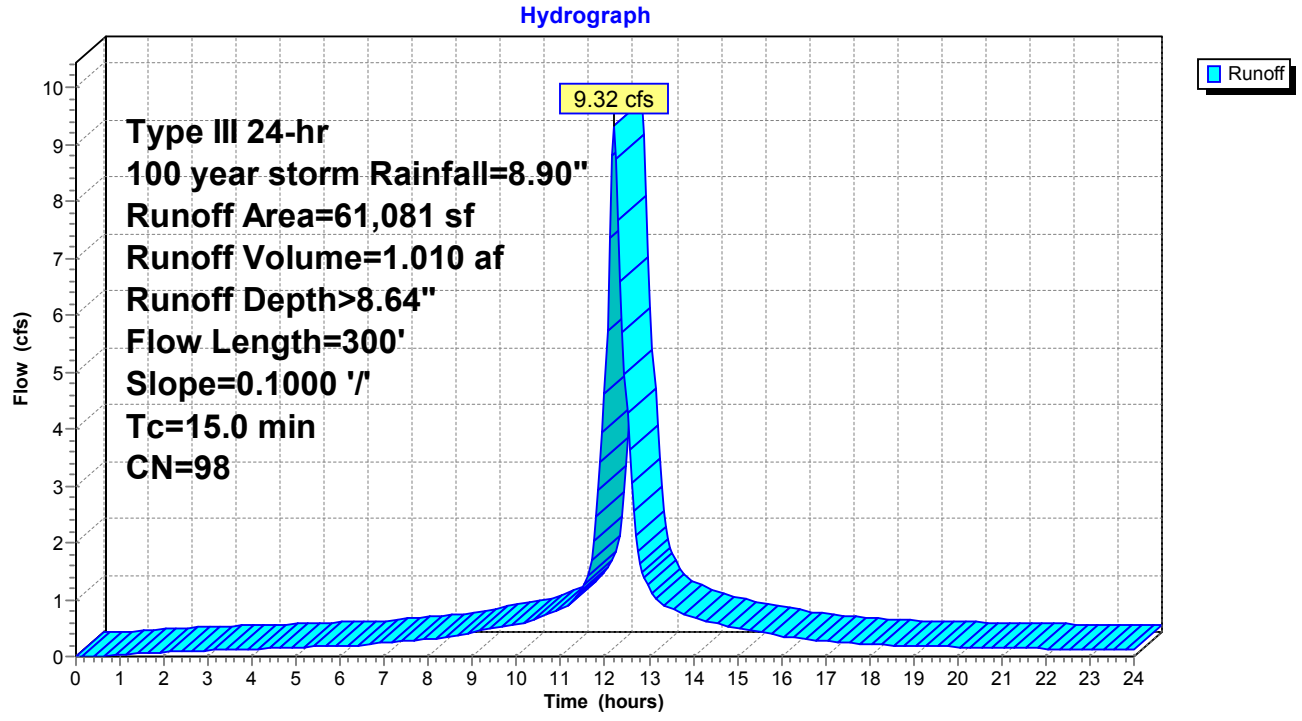
Runoff = 9.32 cfs @ 12.20 hrs, Volume= 1.010 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
61,081	98	Roofs, HSG A
61,081		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, North 1/2 Roof Collected Runoff & Parking Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E1-IMPERV: 1/2 ROOF & Parking catchment areas flowing into Finger Swale


Hydrograph
Runoff
9.32 cfs
Type III 24-hr
100 year storm Rainfall=8.90"
Runoff Area=61,081 sf
Runoff Volume=1.010 af
Runoff Depth>8.64"
Flow Length=300'
Slope=0.1000 '/'
Tc=15.0 min
CN=98
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Subcatchment E2-PERV: Existing soil embankment flowdown area E2

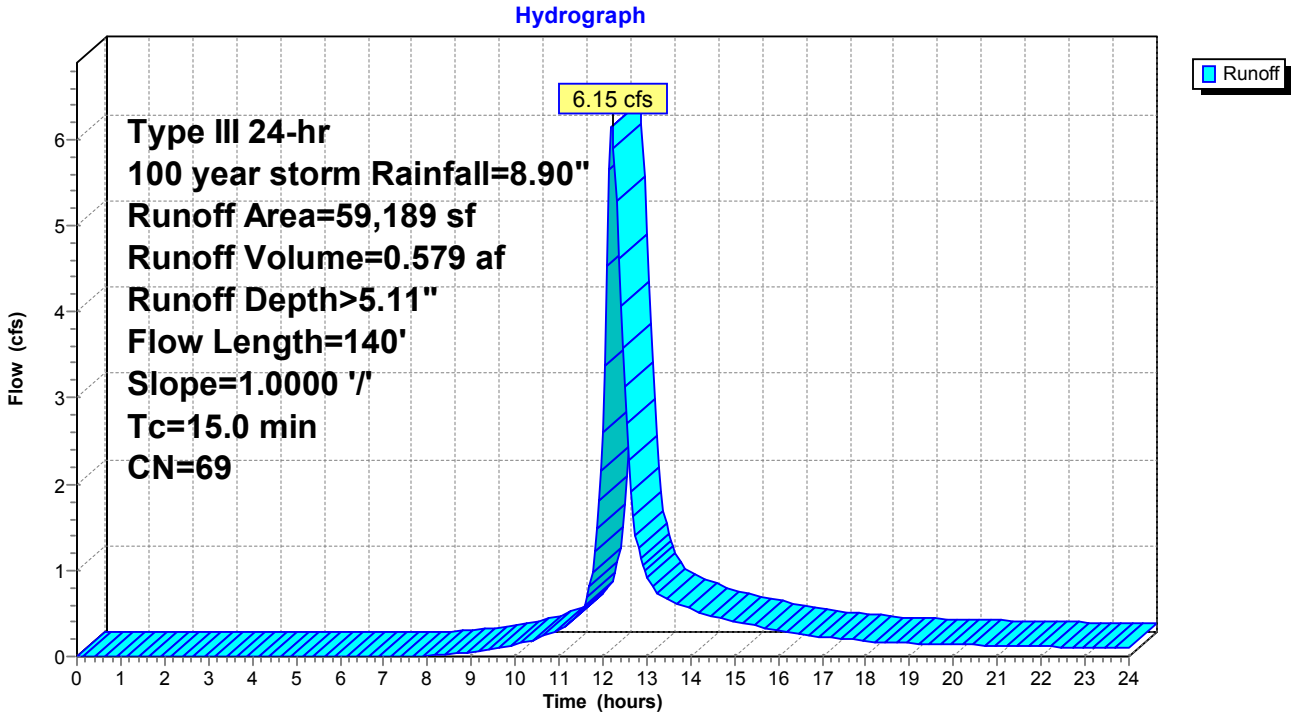
Runoff = 6.15 cfs @ 12.21 hrs, Volume= 0.579 af, Depth> 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
59,189	69	50-75% Grass cover, Fair, HSG B
59,189		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	140	1.0000	0.84		**Sheet Flow, overland embankment downslope runoff in to finger sw** Grass: Short n= 0.150 P2= 3.00"
2.8	140	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E2-PERV: Existing soil embankment flowdown area E2



Summary for Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin

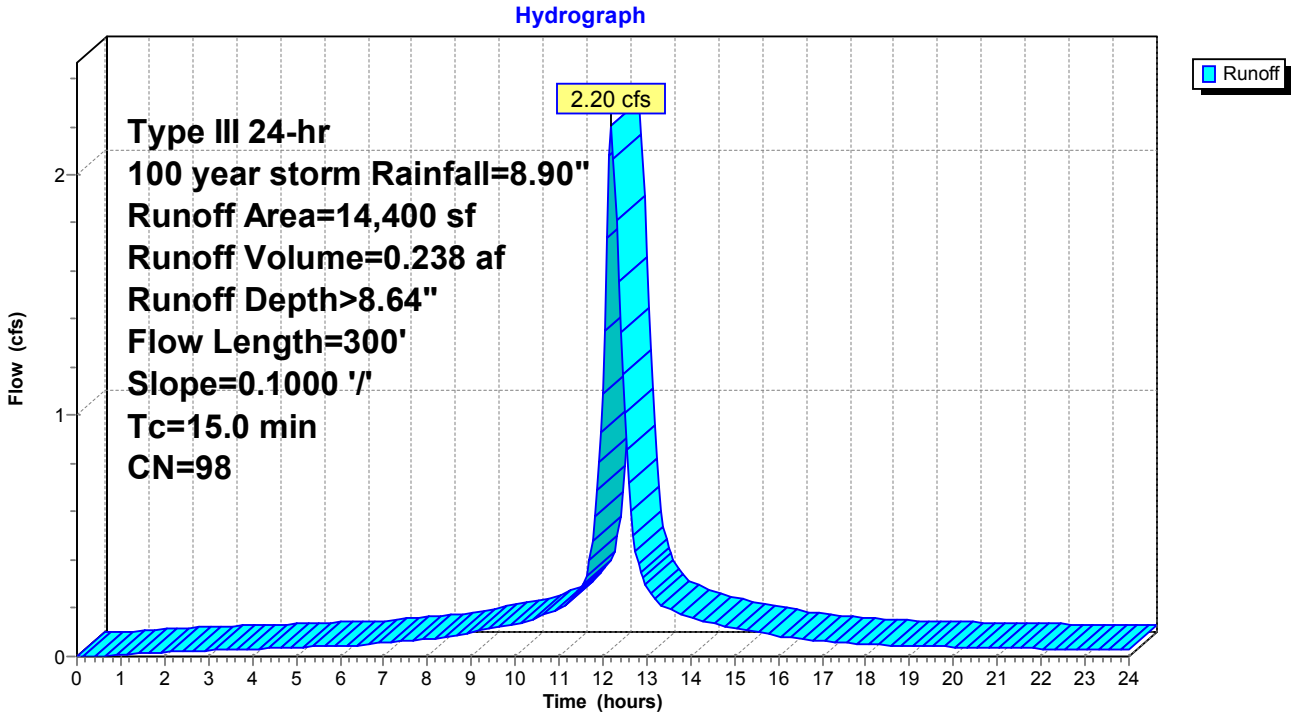
Runoff = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
14,400	98	Roofs, HSG A
14,400		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	300	0.1000	3.16		**Sheet Flow, South 1/2 Roof Collected Runoff Surface** Smooth surfaces n= 0.011 P2= 3.00"
1.6	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment E3-IMPERV: 1/2 ROOF catchment area flowing into Basin



Summary for Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1

Inflow Area = 0.331 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 2.20 cfs @ 12.20 hrs, Volume= 0.238 af
Outflow = 0.20 cfs @ 13.45 hrs, Volume= 0.192 af, Atten= 91%, Lag= 75.0 min
Discarded = 0.20 cfs @ 13.45 hrs, Volume= 0.192 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 72.52' @ 13.45 hrs Surf.Area= 4,728 sf Storage= 5,833 cf

Plug-Flow detention time= 310.7 min calculated for 0.191 af (80% of inflow)
Center-of-Mass det. time= 235.3 min (982.3 - 747.0)

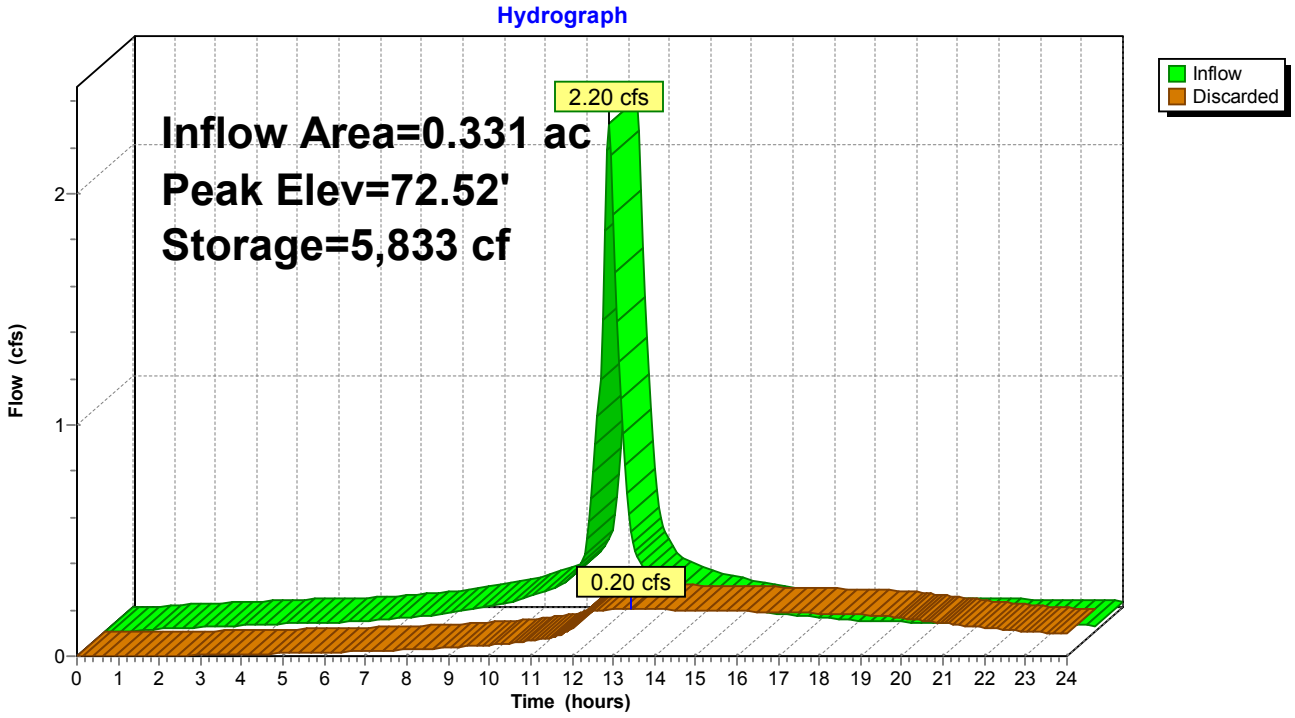
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	21,263 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	2,950	0	0
72.00	4,100	3,525	3,525
73.00	5,300	4,700	8,225
74.00	6,550	5,925	14,150
75.00	7,675	7,113	21,263

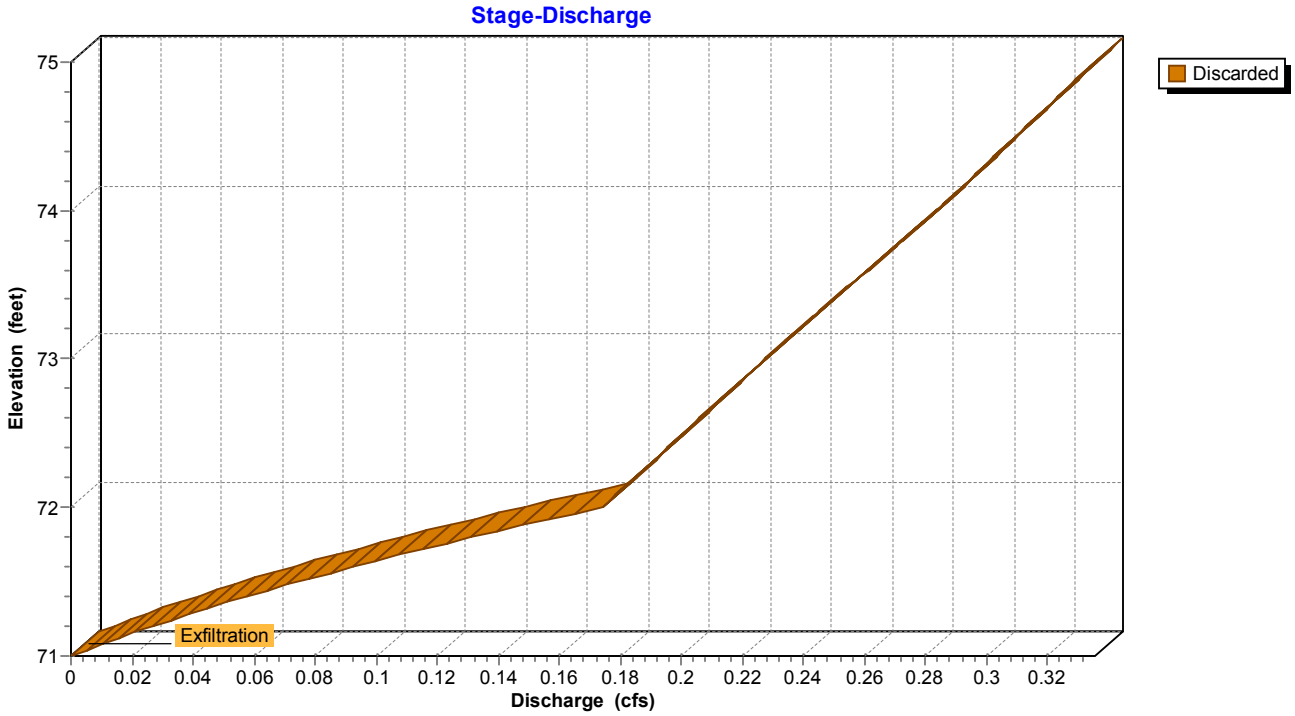
Device	Routing	Invert	Outlet Devices
#1	Discarded	71.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 8.00' Phase-In= 1.00'

Discarded OutFlow Max=0.20 cfs @ 13.45 hrs HW=72.52' (Free Discharge)
↑**1=Exfiltration** (Controls 0.20 cfs)

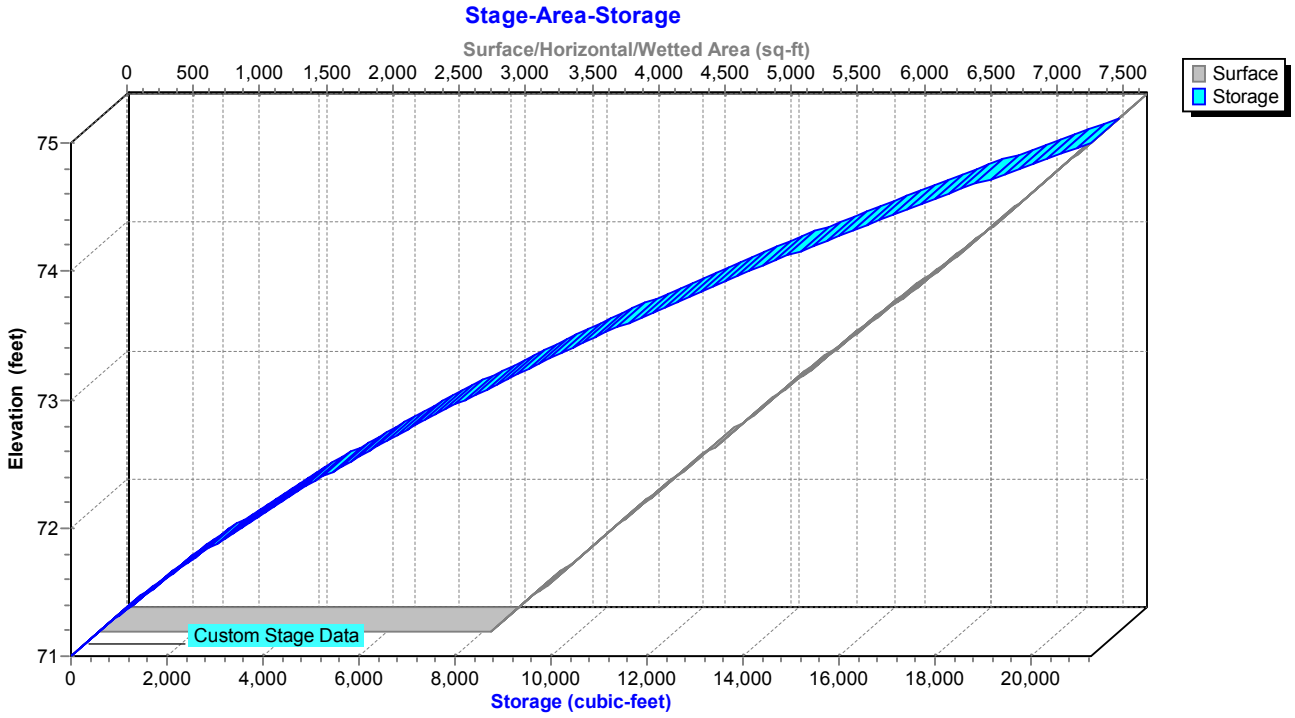
Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Pond EDB: Design Point of Analysis #1 Existing Enlarged Detention Basin #1



Summary for Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area

Inflow Area = 2.761 ac, 50.79% Impervious, Inflow Depth > 6.90" for 100 year storm event
Inflow = 15.47 cfs @ 12.20 hrs, Volume= 1.589 af
Outflow = 4.57 cfs @ 12.65 hrs, Volume= 1.464 af, Atten= 70%, Lag= 26.6 min
Secondary = 4.57 cfs @ 12.65 hrs, Volume= 1.464 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 75.04' @ 12.65 hrs Surf.Area= 0.320 ac Storage= 0.618 af

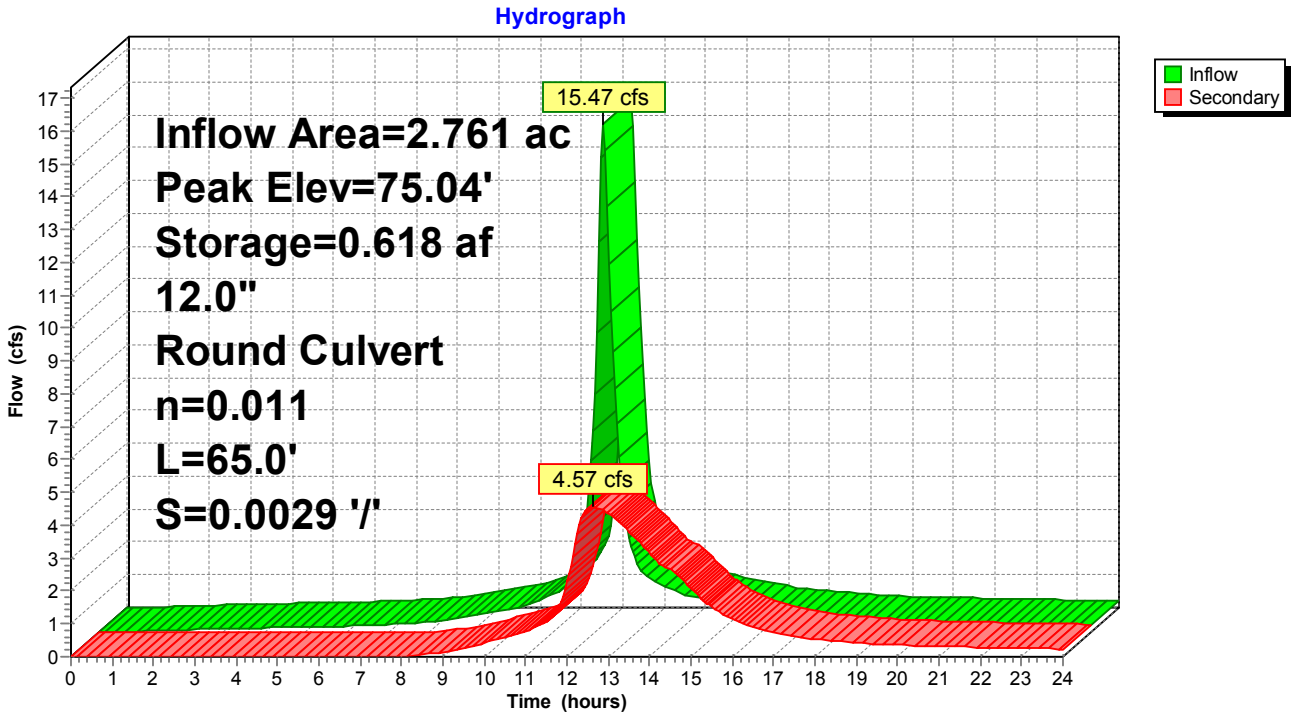
Plug-Flow detention time= 127.7 min calculated for 1.464 af (92% of inflow)
Center-of-Mass det. time= 87.0 min (863.8 - 776.8)

Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	3.363 af	**20.00'W x 210.00'L x 8.00'H Prismatoid Z=6.0**

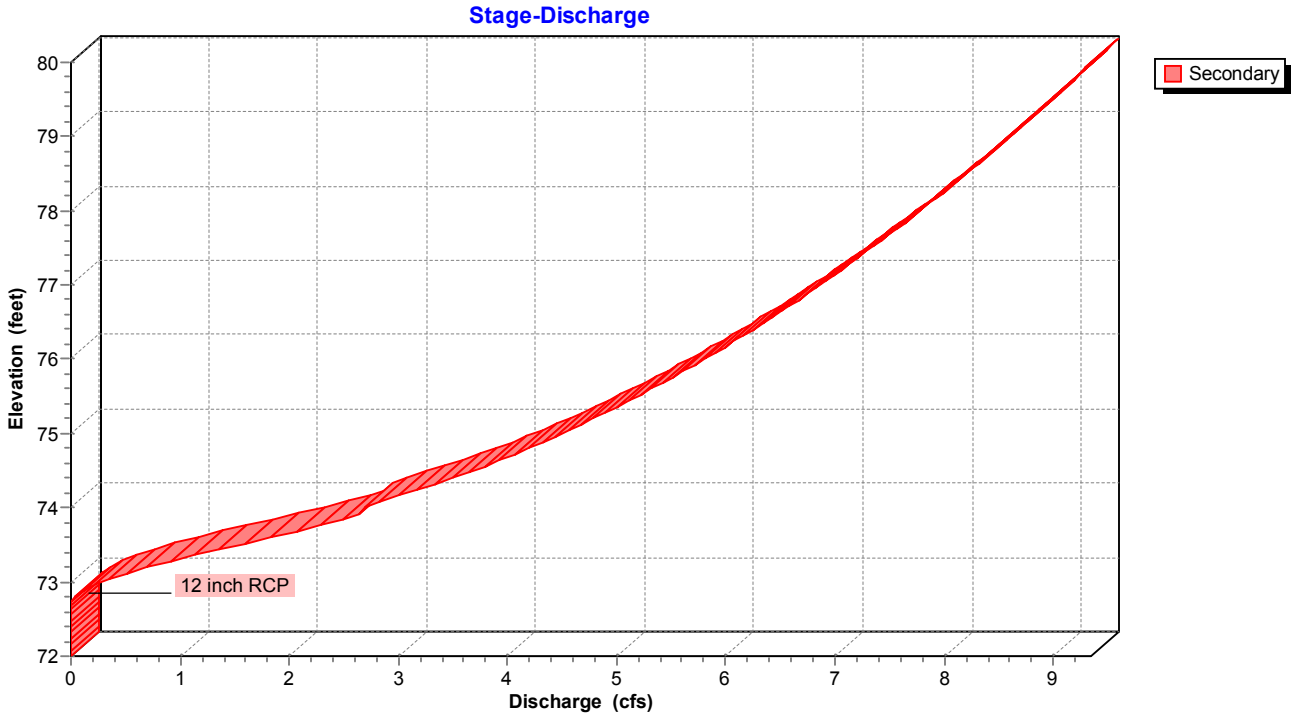
Device	Routing	Invert	Outlet Devices
#1	Secondary	72.68'	**12.0" Round 12 inch RCP** L= 65.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 72.68' / 72.49' S= 0.0029 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Secondary OutFlow Max=4.57 cfs @ 12.65 hrs HW=75.04' (Free Discharge)
1=12 inch RCP (Barrel Controls 4.57 cfs @ 5.81 fps)

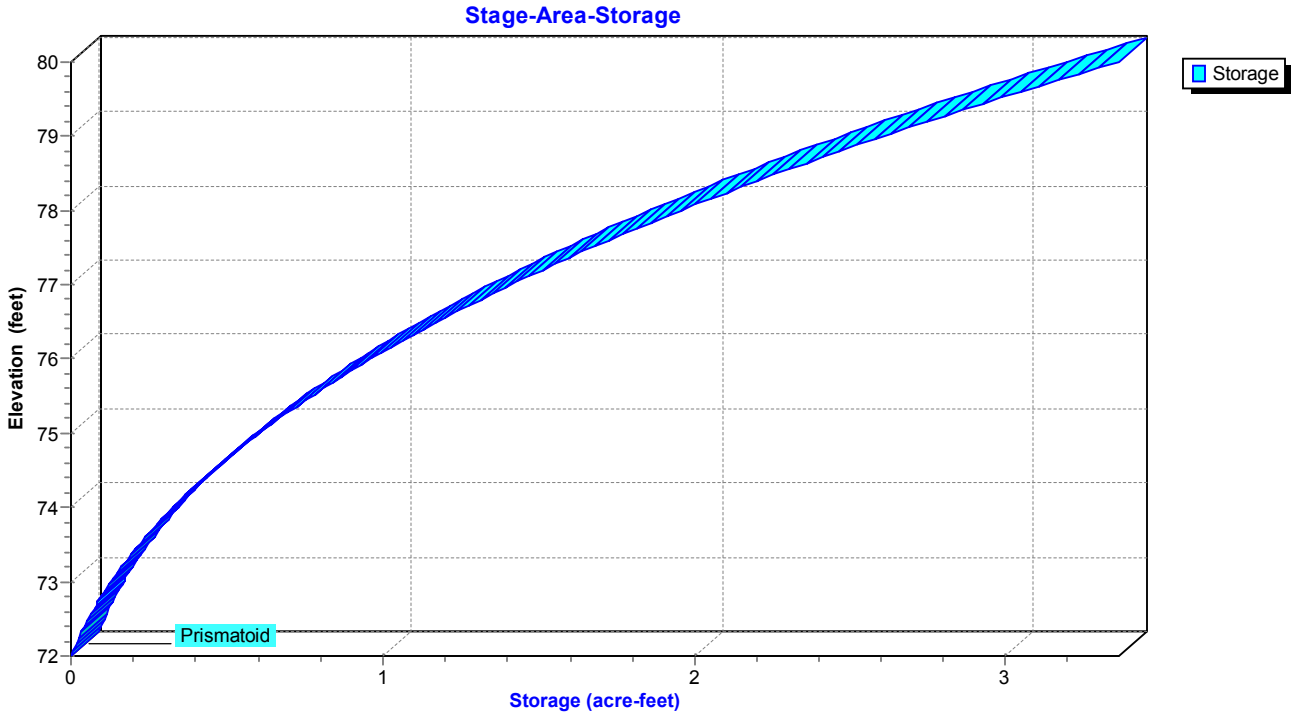
Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



Pond Ex FS: Design Point of Analysis #1 Existing finger swale collection area



ary for Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage

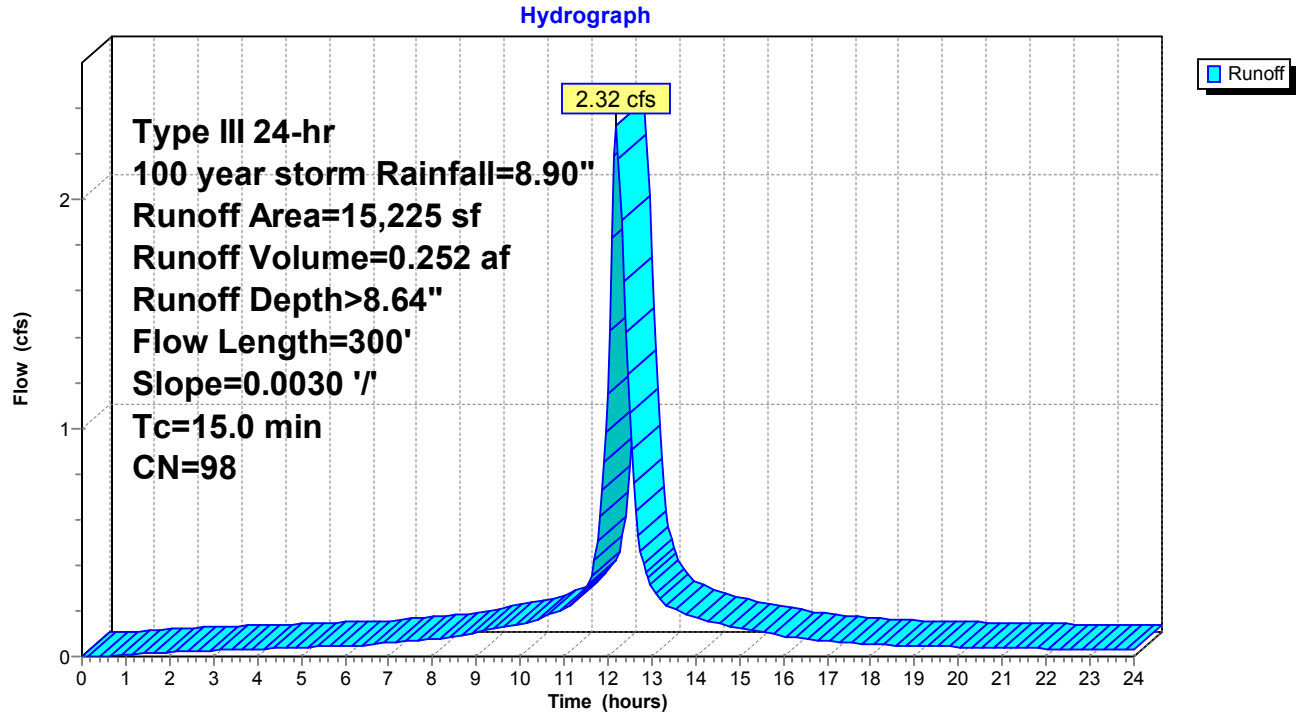
Runoff = 2.32 cfs @ 12.20 hrs, Volume= 0.252 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
15,225	98	Paved roads w/curbs & sewers, HSG A
15,225		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	300	0.0030	0.78		**Sheet Flow, overland runoff toward stone ballast areas** Smooth surfaces n= 0.011 P2= 3.00"
6.4	300	Total, Increased to minimum Tc = 15.0 min			

Subcatchment P 4-IMPERV: Proposed repaved ground surface area P4 around New ballasted storage tracks



Summary for Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin

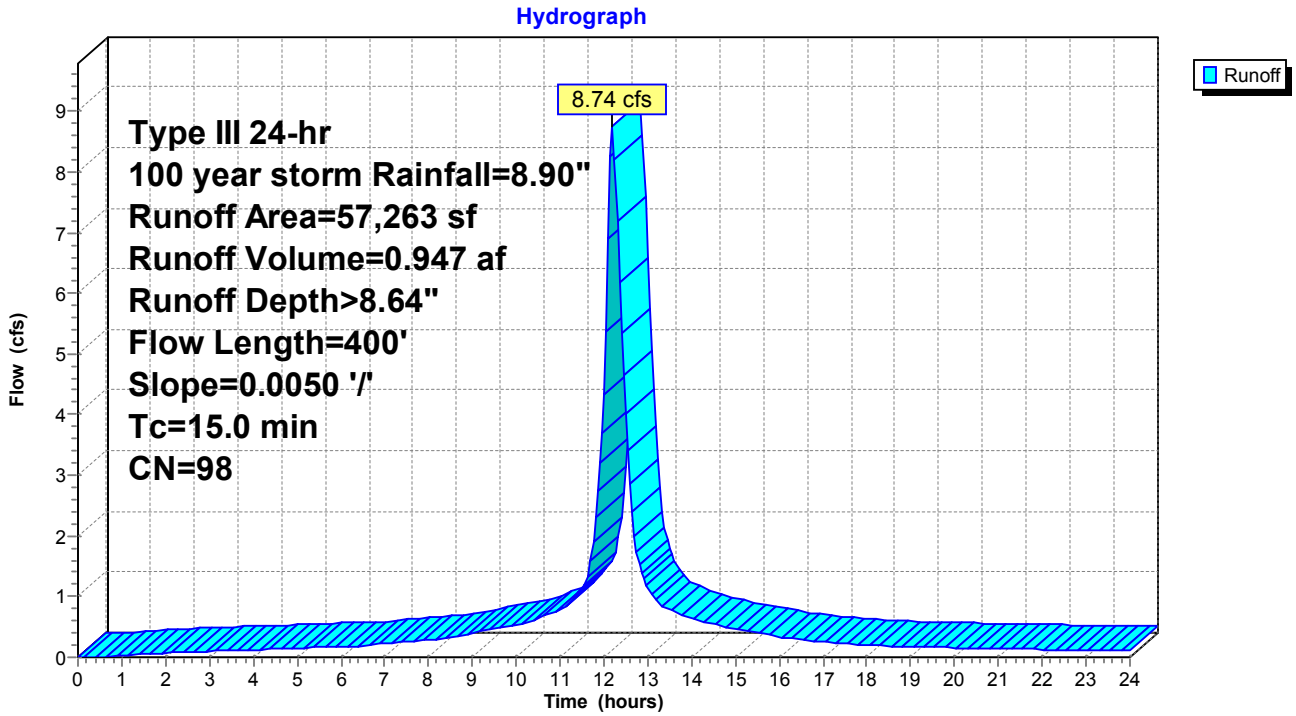
Runoff = 8.74 cfs @ 12.20 hrs, Volume= 0.947 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
57,263	98	Paved roads w/curbs & sewers, HSG A
57,263		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	200	0.0050	0.88		**Sheet Flow, Proposed Paved Surface Areaa** Smooth surfaces n= 0.011 P2= 3.00"
2.3	200	0.0050	1.44		**Shallow Concentrated Flow, Proposed Paved Surface Area** Paved Kv= 20.3 fps
6.1	400	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PP 5 IMPV: Proposed Paved Area betw New Tracks and Prop Detention Basin



Summary for Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2

Inflow Area = 1.795 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 11.93 cfs @ 12.20 hrs, Volume= 1.293 af
Outflow = 2.16 cfs @ 12.79 hrs, Volume= 0.926 af, Atten= 82%, Lag= 35.5 min
Discarded = 0.48 cfs @ 12.79 hrs, Volume= 0.510 af
Secondary = 1.69 cfs @ 12.79 hrs, Volume= 0.416 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 74.51' @ 12.79 hrs Surf.Area= 10,900 sf Storage= 30,007 cf

Plug-Flow detention time= 242.7 min calculated for 0.924 af (71% of inflow)
Center-of-Mass det. time= 150.4 min (897.3 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1	70.50'	35,623 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

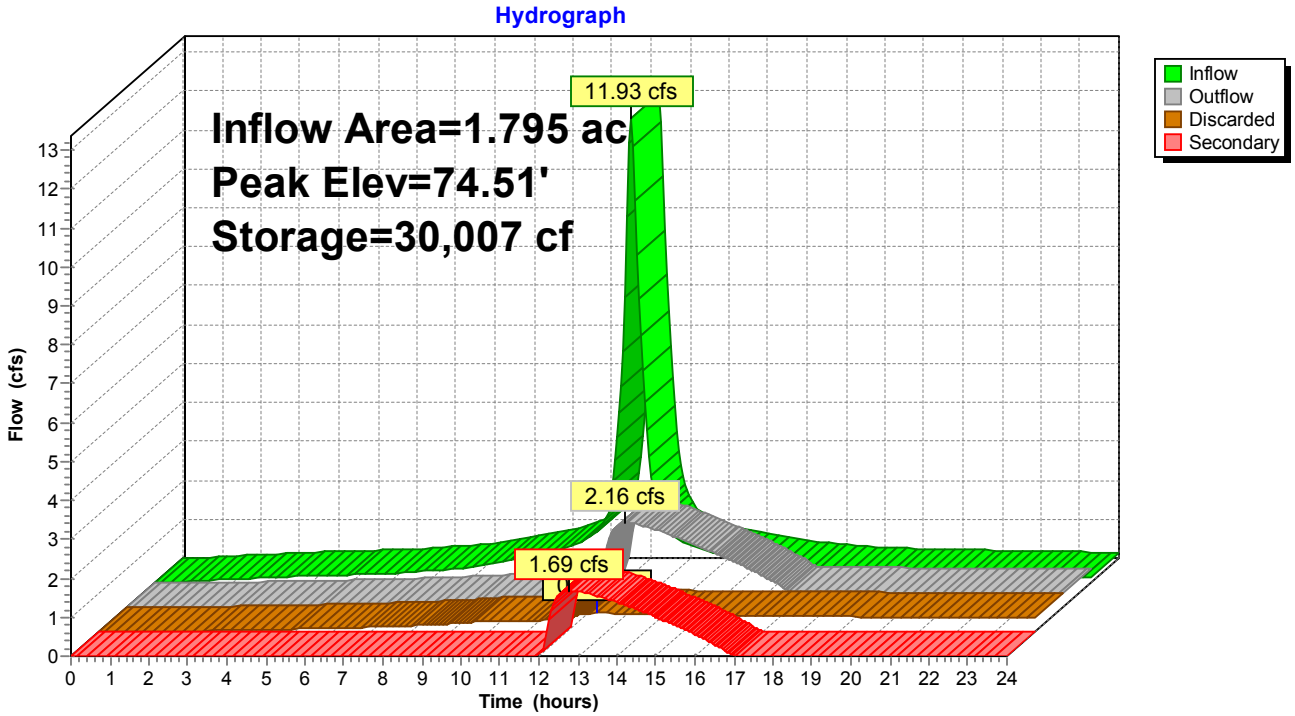
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.50	4,780	0	0
71.00	5,240	2,505	2,505
72.00	6,535	5,888	8,393
73.00	8,145	7,340	15,733
74.00	9,865	9,005	24,738
75.00	11,905	10,885	35,623

Device	Routing	Invert	Outlet Devices
#1	Discarded	70.50'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.50' Phase-In= 1.00'
#2	Secondary	73.50'	**8.0" Horiz. Orifice/Grate** C= 0.600 in 60.0" x 60.0" Grate (1% open area)

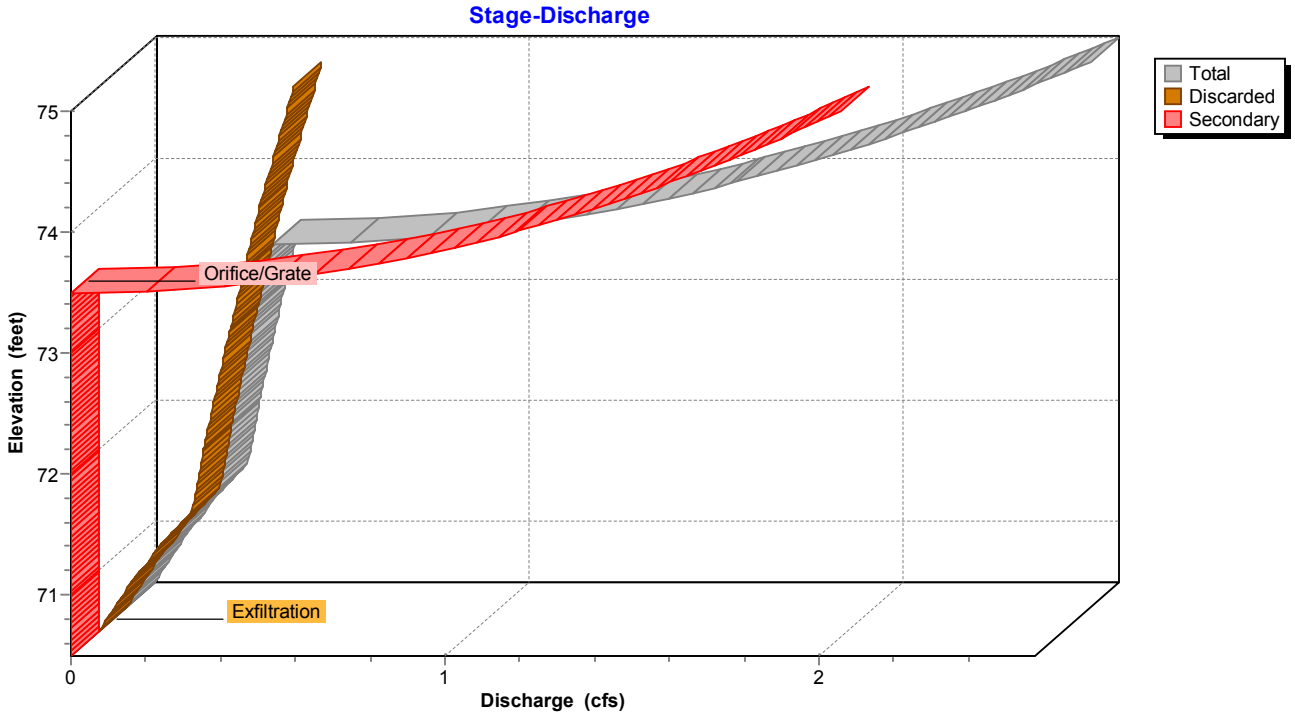
Discarded OutFlow Max=0.48 cfs @ 12.79 hrs HW=74.51' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.48 cfs)

Secondary OutFlow Max=1.69 cfs @ 12.79 hrs HW=74.51' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 1.69 cfs @ 4.83 fps)

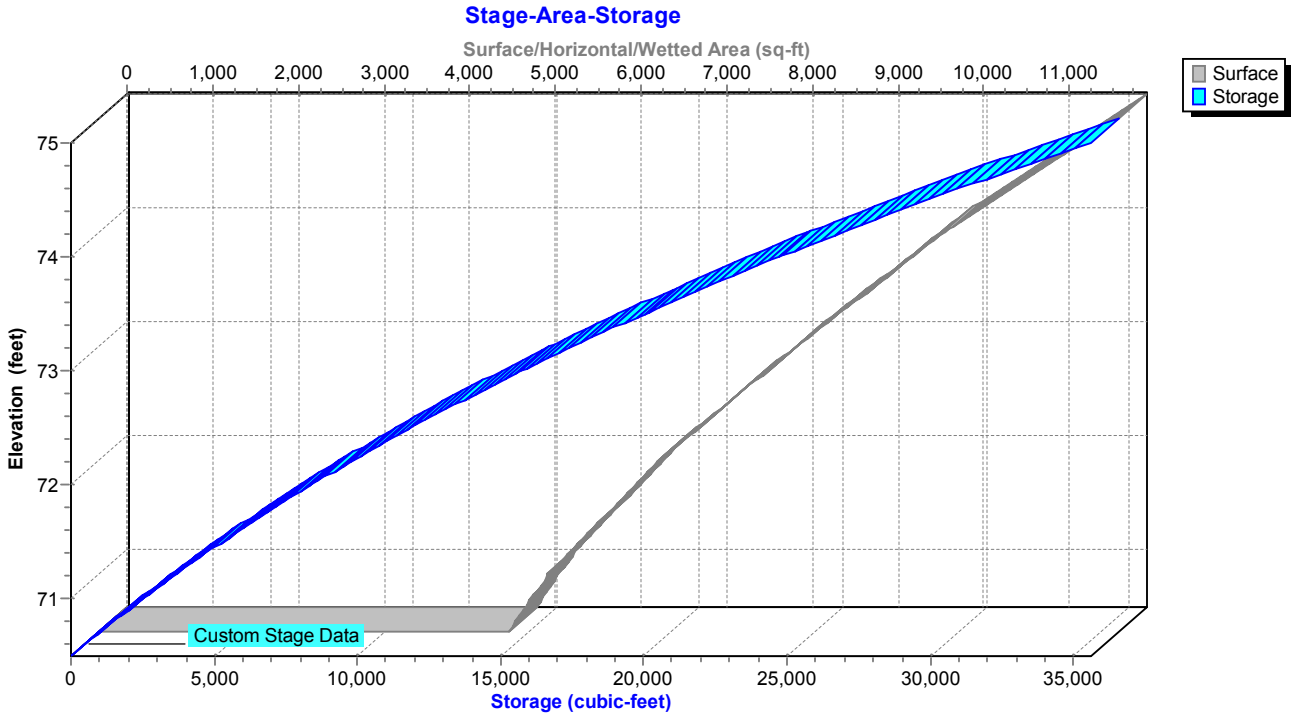
Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Pond PR DB: Design Point of Analysis #3 Proposed Detention Basin #2



Summary for Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2

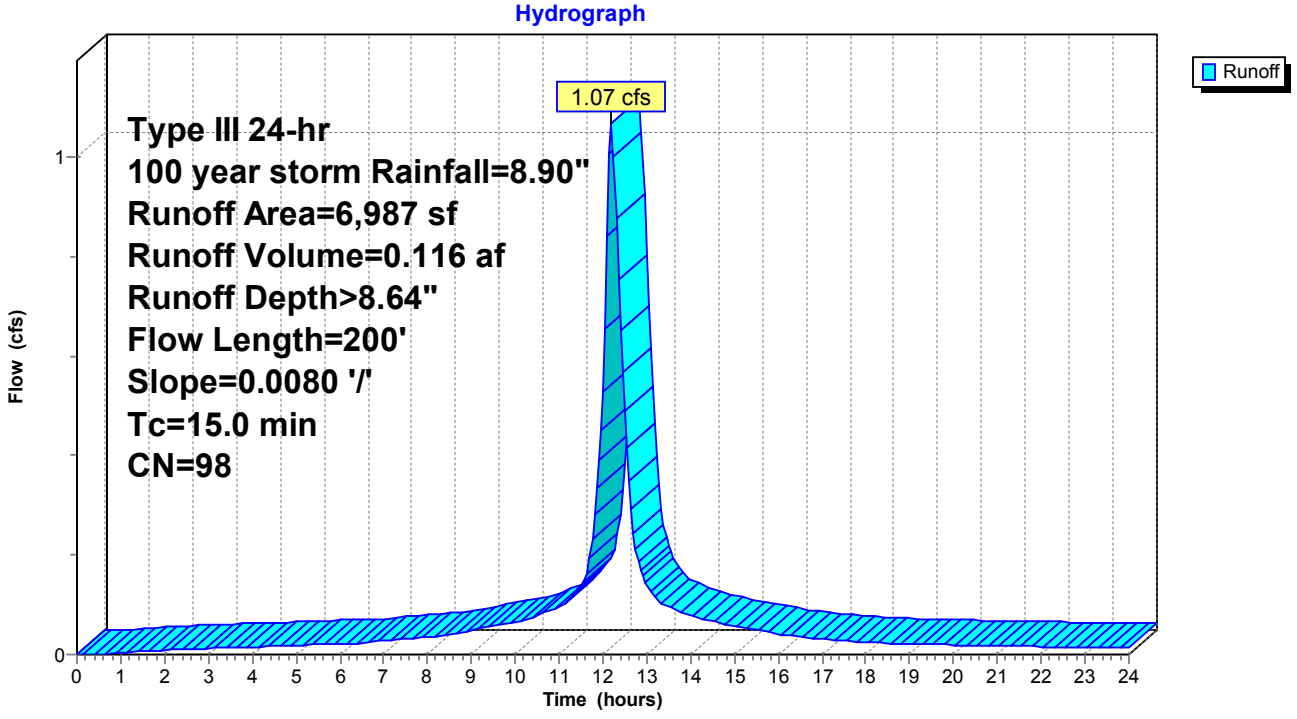
Runoff = 1.07 cfs @ 12.20 hrs, Volume= 0.116 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
6,987	98	Paved parking, HSG A
6,987		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	200	0.0080	1.06		**Sheet Flow, New paved driveway to Kings HWY** Smooth surfaces n= 0.011 P2= 3.00"
3.1	200	Total, Increased to minimum Tc = 15.0 min			

Subcatchment PR DW: Proposed Driveway previously Exist Ground Area 2



or Pond PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped

Inflow Area = 0.350 ac,100.00% Impervious, Inflow Depth > 8.64" for 100 year storm event
Inflow = 2.32 cfs @ 12.20 hrs, Volume= 0.252 af
Outflow = 0.50 cfs @ 12.72 hrs, Volume= 0.242 af, Atten= 79%, Lag= 31.6 min
Discarded = 0.50 cfs @ 12.72 hrs, Volume= 0.242 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.31' @ 12.72 hrs Surf.Area= 37,697 sf Storage= 4,720 cf

Plug-Flow detention time= 153.7 min calculated for 0.242 af (96% of inflow)
Center-of-Mass det. time= 129.2 min (876.2 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1	68.00'	90,473 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 226,182 cf Overall x 40.0% Voids

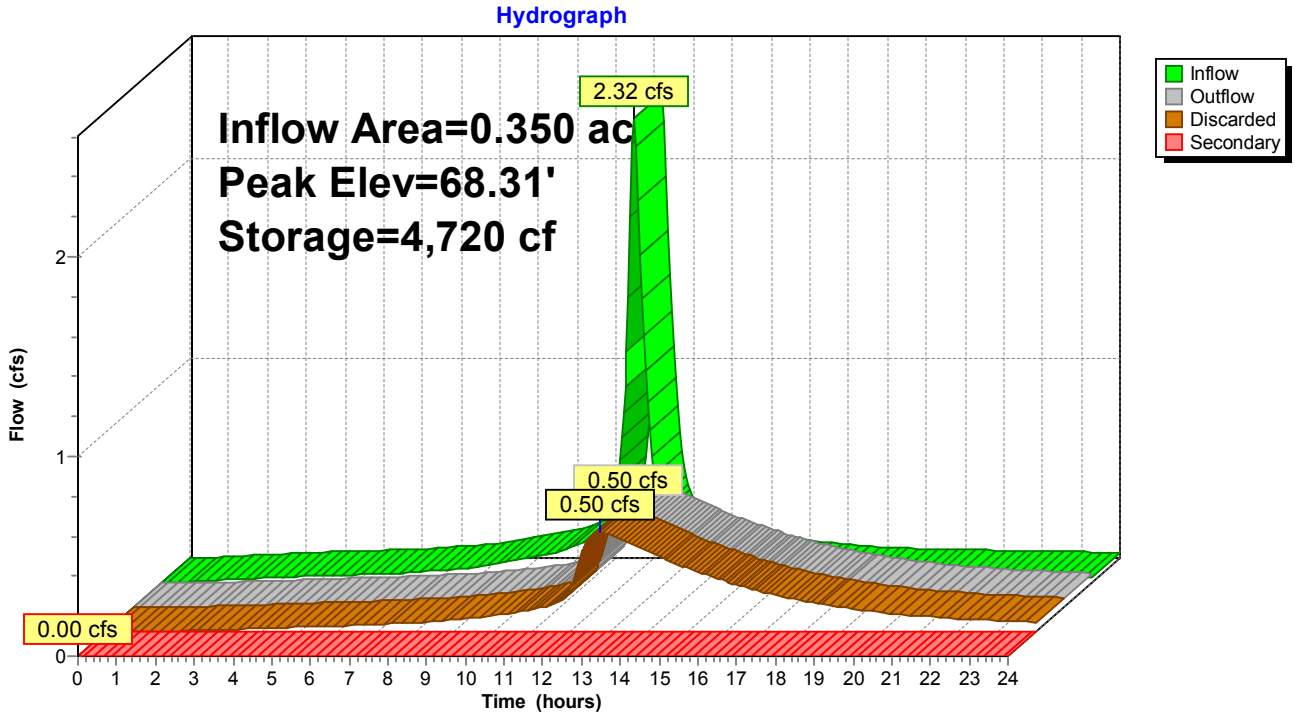
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
68.00	37,697	0	0
69.00	37,697	37,697	37,697
70.00	37,697	37,697	75,394
71.00	37,697	37,697	113,091
72.00	37,697	37,697	150,788
73.00	37,697	37,697	188,485
74.00	37,697	37,697	226,182

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**1.810 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 6.00' Phase-In= 1.00'
#2	Secondary	73.50'	**18.0" Round Culvert** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 73.50' / 73.20' S= 0.0030 '/' Cc= 0.900 n= 0.014 Steel, smooth, Flow Area= 1.77 sf

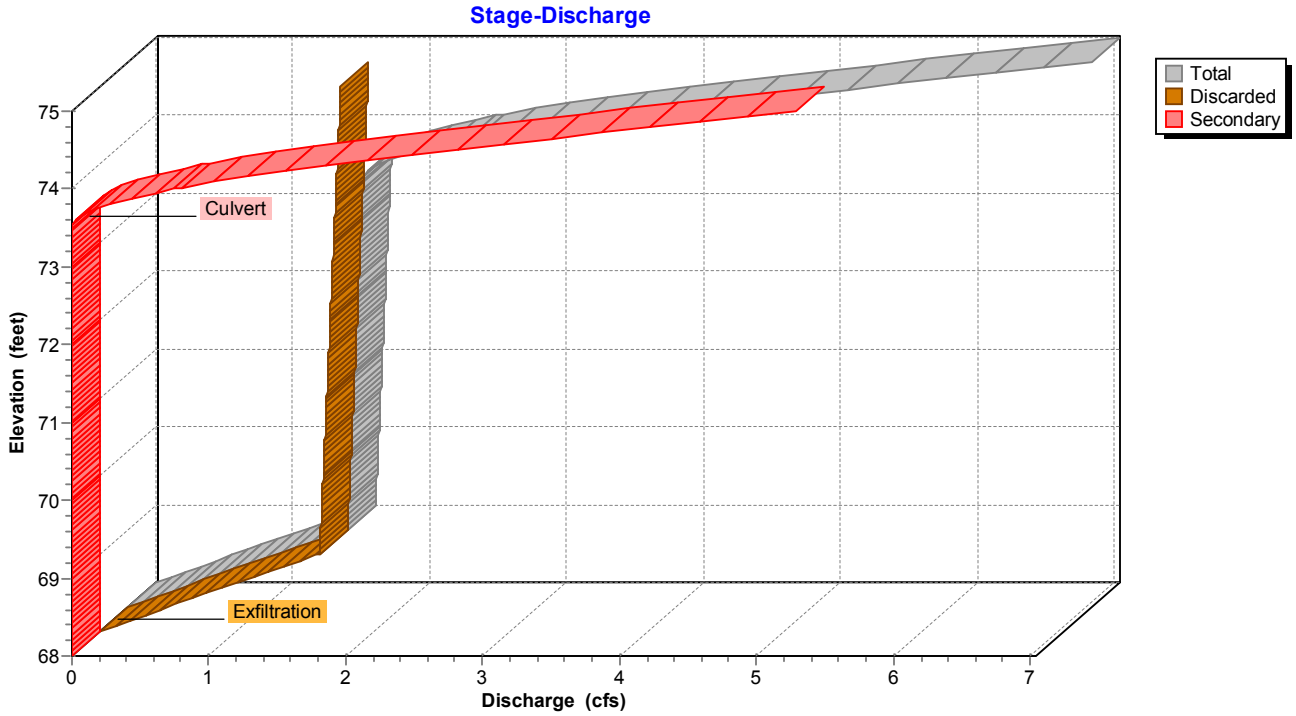
Discarded OutFlow Max=0.50 cfs @ 12.72 hrs HW=68.31' (Free Discharge)
1=Exfiltration (Controls 0.50 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=68.00' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

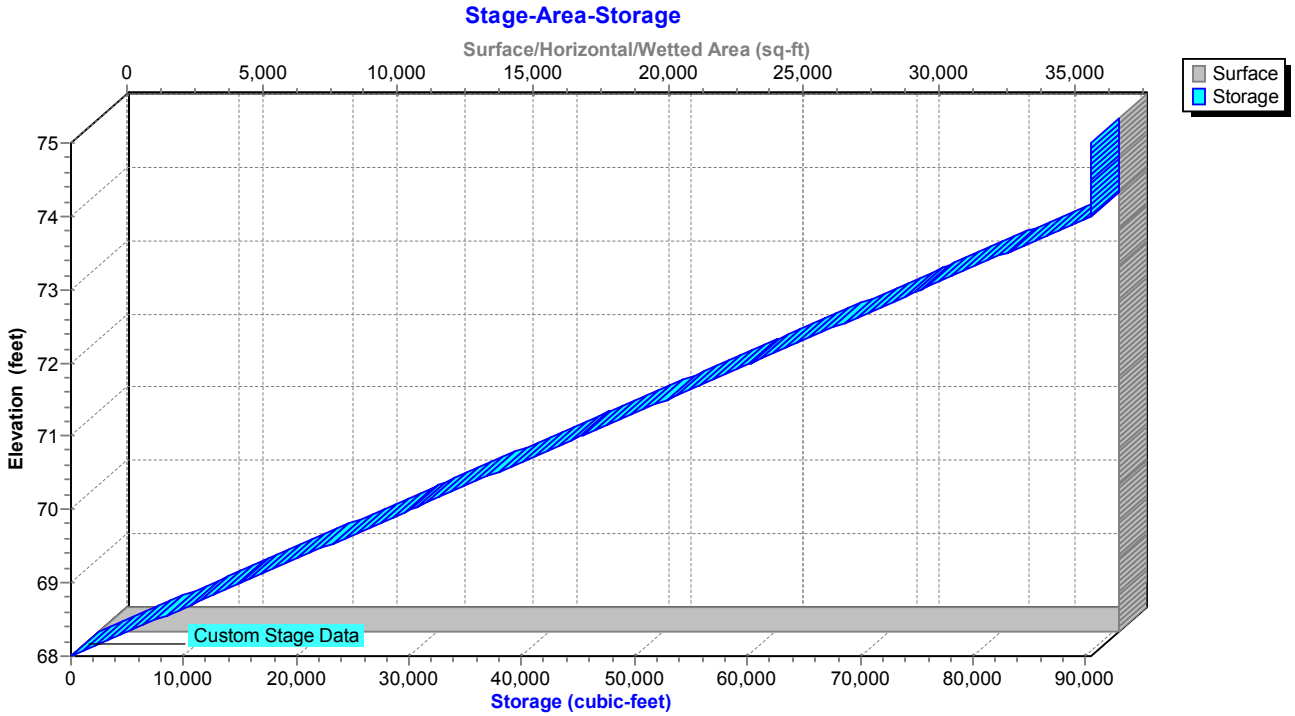
d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



d PR-BTR: Design Point of Analysis #2 Proposed Ballasted Tracks pervious areas with overflow piped to Bas



Summary for Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks

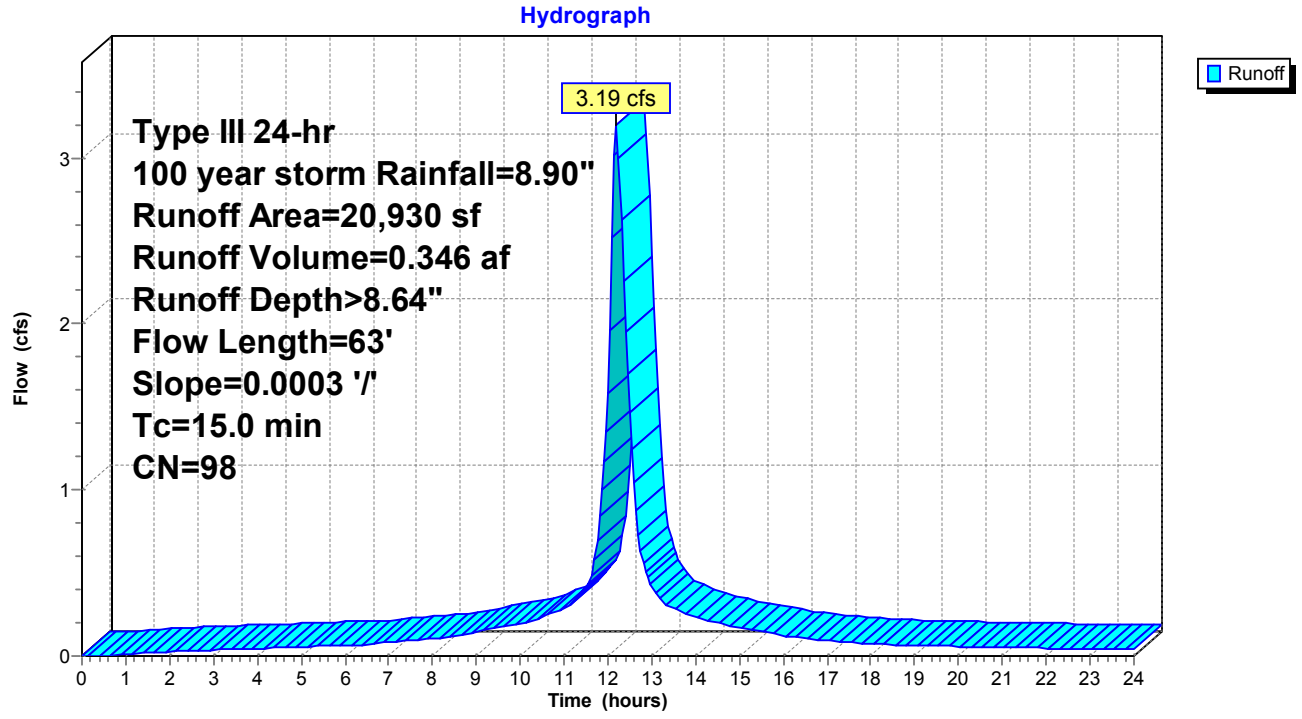
Runoff = 3.19 cfs @ 12.20 hrs, Volume= 0.346 af, Depth> 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
20,930	98	Unconnected pavement, HSG C
20,930		100.00% Impervious Area
20,930		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	63	0.0003	0.23		**Sheet Flow, sheet flow over flat cracked surface** Smooth surfaces n= 0.011 P2= 3.00"
4.6	63	Total, Increased to minimum Tc = 15.0 min			

Subcatchment RPE4 IMPV: Repaved impervious ground surface around new storage tracks



Summary for Pond W 1: Existing Wetland Area 1

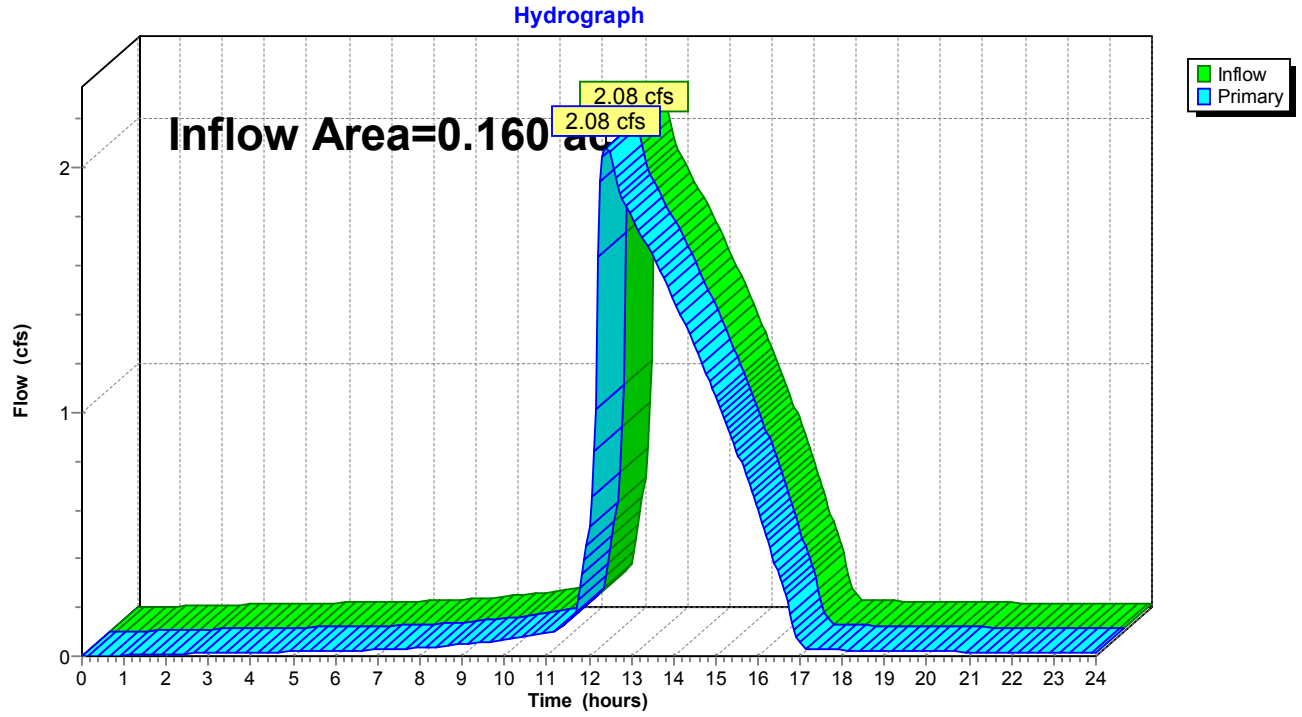
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Summary for Pond W 2: Existing Wetland Area 2

Inflow Area = 0.160 ac,100.00% Impervious, Inflow Depth > 39.77" for 100 year storm event
Inflow = 2.08 cfs @ 12.41 hrs, Volume= 0.532 af
Primary = 2.08 cfs @ 12.41 hrs, Volume= 0.532 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond W 2: Existing Wetland Area 2



Summary for Pond W 3: Existing Wetland Area 3

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Appendix C:
Total Suspended Solids Calculations (TSS)

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Rochester, Massachusetts

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Grass Channel	**0.50**	**0.75**	**0.38**	**0.38**
Infiltration Basin	**0.80**	**0.38**	**0.30**	**0.08**
	0.00	**0.08**	**0.00**	**0.08**
	0.00	**0.08**	**0.00**	**0.08**

Total TSS Removal = **93%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: MBTA - Rochester Project

Prepared By: Gus Raposo

Date: 9/20/2021

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Appendix D:
Soils Map and Soils Evaluation Data

Soils Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Plymouth County, Massachusetts

August 25, 2021

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,440 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 13, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 9, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11A	Rainberry coarse sand, 0 to 3 percent slopes	0.4	1.5%
37A	Massasoit - Mashpee complex, 0 to 3 percent slopes	1.1	3.7%
52A	Freetown muck, 0 to 1 percent slopes	0.5	1.6%
53A	Freetown muck, ponded, 0 to 1 percent slopes	0.1	0.3%
60A	Swansea coarse sand, 0 to 2 percent slopes	0.2	0.7%
253B	Hinckley loamy sand, 3 to 8 percent slopes	3.8	13.0%
253C	Hinckley loamy sand, 8 to 15 percent slopes	6.0	20.6%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	1.2	4.2%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	10.5	35.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	0.0	0.2%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	3.4	11.5%
483C	Barnstable - Plymouth complex, 8 to 15 percent slopes, very bouldery	0.2	0.5%
665B	Udipsamments, 0 to 8 percent slopes	1.9	6.5%
Totals for Area of Interest		**29.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made

up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Soils Evaluation Data

Prop. TP NO. 2

Isolated Wetland

Prop. TP NO. 1 near the material stockpile. Overhead and underground Electrical is present

Isolated Wetland

Wetland

Prop. Drainage Basin

Prop. TP NO. 3

Prop. TP NO. 4

Prop. TP NO. 5

Prop. TP NO. 9 - Overhead Electric in the area

Prop. TP NO. 8 - Overhead Electric in the area

Prop. Lead Track to the Facility

Wetland

Prop. TP NO. 6 - underground gas lines may be present. Coordinate with MBTA Staff on locations

Prop. TP NO. 7 - underground gas lines may be present. Coordinate with MBTA Staff on locations

Prop. Ret. Wall (TYP.)

200' OF STORAGE

650' OF STORAGE

450' OF STORAGE

400' OF STORAGE

375' OF STORAGE

350'

EASEMENT IN NEW BEDFORD GAS AND EDISON LIGHT COMPANY

RAILROAD SPUR EASEMENT

ASSESSORS MAP 17 LOT 21 (AREA=8.01 ACRES)

MAP 17 LOT 21 A N/F ROCHESTER BITUMINOUS PRODUCTS, INC.

NOTICE OF INTENT SUBMISSION

PROGRESS SUBMITTAL

THIS SUBMITTAL IS INTENDED FOR REVIEW PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES

DATE: 8/23/21

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CAPE MAIN RAIL LINE
ROCHESTER MAINTENANCE FACILITY
MBTA CONTRACT NO. XXXXXX

PROPOSED TEST PIT AND PERK TEST LOCATIONS

massDOT Massachusetts Department of Transportation

ISSUE	DATE	DESCRIPTION	BY	CHK'D	APP

Jacobs

PROJECT MANAGER DATE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SCALE: N.T.S.	DRAWN BY	DESIGN BY	CHECK BY	PLAN NO. XXXX	ISSUE
DATE: SEPT. 2021	XXX	XXX	XXX	SHEET **X-X**	

FILE NAME: P:\MBTA\2021\E2X69804 - MBTA Rochester Maintenance Facility\TASK 02 - Yard Tark Improvements\700 CADD\704 - CIVIL\30% NOI\NOI Graphics\ C-PROP_TESTPIT.dwg
PLOT DATE: Aug 23, 2021 - 2:21 pm

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

MBTA Rochester
Owner Name

45 Kings Highway
Street Address

Map 17 Lot 21
Map/Lot #

West Wareham
City

MA
State

02576
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 253 B&C (Soil Map Unit)

Hinckley Loamy Sand
Soil Name

Soil Limitations

Sandy and gravelly glaciofluvial
Soil Parent material

Outwash terraces, outwash deltas, outwash plains, eskers, moraines
Landform

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published/Source; Map Unit

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type

7. Current Water Resource Conditions (USGS): 7/18/2021 (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☒ Below Normal (40th percentile)

8. Other references reviewed:

Three USGS wells in the region were reviewed. All were at similar levels.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) | 7/22/21 (Date) | 11:30 am (Time) | Sunny 80 (Weather) | (Latitude) | (Longitude:)

1. Land Use: cleared area (e.g., woodland, agricultural field, vacant lot, etc.) | none (Vegetation) | None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | <1% (Slope (%))

Description of Location: 20 feet off pavement at entrance; 4-5' of gravel previously removed

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits | Outwash (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 20' feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: 108" Depth Weeping from Pit | 112" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-76	1C	coarse sand	7.5YR 7/4	Not	observed		5%	Trace	Granular	Loose	
76-120	2C	F-M Sand	5YR 5/8	Not observed; see notes			-	-	Massive	Extremely Firm	

Additional Notes: 76 to 120" hard to dig; sand appeared to have high iron content; red color consistent throughout layer.

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 (Hole #) 7/22/21 (Date) 11:00 am (Time) Sunny 80 (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Trees (Vegetation) None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) <1% (Slope (%)

Description of Location: in wooded area 100'+/- south east of TP-1

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits Outwash (Landform) SH (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet
Property Line 50' feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Not observed Depth Weeping from Pit Not observed Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	loamy Sand	7.5 YR 3/2				-	-			
4-36	Bw	loamy Sand	7.5 YR 5/8				2%	-	Massive	Friable	
36-70	C1	Coarse Sand	10YR 6/8	Not observed			25%	5%	Massive	Friable	
70-132	C2	Coarse Sand	10YR 7/4	Not observed			10%	2%	Granular	Loose	

Additional Notes: had to move test pit approximately 40' south due to downed trees; could not reach water table

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 1	Obs. Hole # 2
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	77" inches	101" inches

415217070393102 (Index Well Number) 6/22/2021 (Reading Date) (see attached calculations)

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 (Hole #) 7/22/21 (Date) 10:00 am (Time) Sunny 80 (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Trees (Vegetation) None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) <1% (Slope (%)

Description of Location: in wooded area 100'+/- south east of TP-2

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits Outwash (Landform) TS (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands 75' feet
Property Line 40' feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 76" Depth Weeping from Pit 80" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	loamy Sand	7.5 YR 3/2				-	-			
6-30	Bw	loamy Sand	7.5 YR 7/8				1%	-	Massive	Friable	
30-96	C1	Coarse Sand	10YR 6/4	55"	5YR 7/8	50%	10%	2%	Granular	Loose	

Additional Notes: only excavated to 8' due to hole caving in

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 (Hole #) | 7/22/21 (Date) | 9:15 am (Time) | Sunny 80 (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Trees (Vegetation) | None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | <1% (Slope (%))

Description of Location: in wooded area 100'+/- east of pavement @ center large garage door

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits | Outwash (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 110' feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Not observed Depth Weeping from Pit | Not observed Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	loamy Sand	7.5 YR 3/2				-	-			
4-30	Bw	loamy Sand	7.5 YR 6/8				1%	-	Massive	Friable	
30-120	C1	Coarse Sand	10YR 7/4	Not Observed			10%	2%	Granular	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 3	Obs. Hole # 4
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	45" inches	89" inches

415217070393102 (Index Well Number) 6/22/2021 (Reading Date) (see attached calculations)

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-5 (Hole #) 7/22/21 (Date) 8:30 am (Time) Sunny 75 (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Trees (Vegetation) | None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | <1% (Slope (%))

Description of Location: in wooded area 50'+/- east of pavement on range rear building line

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits | Outwash (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 150' feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 88" Depth Weeping from Pit 98" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	loamy Sand	7.5 YR 3/2				-	-			
6-32	Bw	loamy Sand	7.5 YR 6/8				2%	-	Massive	Friable	
32-120	C1	Coarse Sand	10YR 7/4	Not Observed			10%	2%	Granular	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-6 (Hole #) 7/22/21 (Date) 7:45 am (Time) Sunny 70 (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: Parking/storage area (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) | <1% (Slope (%))

   Description of Location: in parking area 60'+/- south of building

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits | Outwash (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 120' feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 126" Depth Weeping from Pit | 130" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-64	Fill	-					-	-			
64-132	C1	coarse Sand	10YR 8/3	Not Observed			10%	-	Granular	Loose	

Additional Notes: fill 0-48" sand/gravel; 48-64" was a layer of organics

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 5	Obs. Hole # 6
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	57" inches	95" inches

415217070393102 (Index Well Number) 6/22/2021 (Reading Date) (see attached calculations)

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7 (Hole #) 7/22/21 (Date) 7:15 am (Time) Sunny 70 (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Parking/storage area (e.g., woodland, agricultural field, vacant lot, etc.) None (Vegetation) None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) <1% (Slope (%)

Description of Location: in parking area 80'+/- south of building

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits Outwash (Landform) SH (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet; Drainage Way >100' feet; Wetlands >100' feet; Property Line 70' feet; Drinking Water Well _____ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 125" Depth Weeping from Pit 130" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	Fill	-	-				-	-			
16-22	A	loamy Sand	7.5 YR 3/2					-	Granular	Loose	
22-48	Bw	f-m loamy sand	7.5 YR 7/8				Trace	-	Massive	Friable	
48-132	C1	coarse Sand	7.5 YR 7/4	Not Observed			10%	-	Granular	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8 (Hole #) 7/22/21 (Date) 12:30 pm (Time) Sunny 80 (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: cleared land (e.g., woodland, agricultural field, vacant lot, etc.) None (Vegetation) None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) <1% (Slope (%)

Description of Location: 80'+/- northwest of building on front range; next to exist drain basin

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits Outwash (Landform) SH (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way 20' feet Wetlands >100' feet
Property Line 30' feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 130" Depth Weeping from Pit Not observed Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-20	Fill	-					-	-			
20-130	C1	coarse Sand	10YR 7/4	Not Observed			10%	2%	Granular	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 7	Obs. Hole # 8
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	94" inches	99" inches

415217070393102 (Index Well Number) 6/22/2021 (Reading Date) (see attached calculations)

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-9 (Hole #) 7/22/21 (Date) 12:00 pm (Time) Sunny 80 (Weather) _____ (Latitude) _____ Longitude:

1. Land Use: cleared land (e.g., woodland, agricultural field, vacant lot, etc.) None (Vegetation) None observed (Surface Stones (e.g., cobbles, stones, boulders, etc.) <1% (Slope (%)

Description of Location: 60'+/- northwest of building; next to exist drain basin

2. Soil Parent Material: Sandy and gravelly glaciofluvial deposits Outwash (Landform) SH (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way 15' feet Wetlands >100' feet
Property Line 60' feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 125" Depth Weeping from Pit 130" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	Fill	-					-	-			
16-130	C1	coarse Sand	10YR 7/4	Not Observed			10%	2%	Granular	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 9	Obs. Hole # _____
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	94" inches	_____ inches

415217070393102 (Index Well Number) 6/22/2021 (Reading Date) (see attached calculations)

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Alan J Gunnison

Signature of Soil Evaluator

7/23/2021

Date

Alan Gunnison License # SE13996

Typed or Printed Name of Soil Evaluator / License #

6/30/2022

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

TP-1

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	9.0	feet	7/22/21 Depth to Weeping in TP-1	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	

Sc - (Sr/Owr) x (Owc-Owmax)

Predicted depth to seasonal high groundwater (Sh)	**6.4 feet**
	77 inches

USGS Well:	Plymouth (120)
	415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-2

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	11.0	feet	07/22/21 bottom of test pit TP-2 since groundwater not observed	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	

Sc - (Sr/Owr) x (Owc-Owmax)

Predicted depth to seasonal high groundwater (Sh)	**8.4 feet**
	101 inches

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-3

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	6.3	feet	7/22/21 Depth to weeping in TP-13	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	

Sc - (Sr/Owr) x (Owc-Owmax)

Predicted depth to seasonal high groundwater (Sh)	**3.7 feet**
	45 inches

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-4

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	10.0	feet	07/22/21 bottom of test pit TP-4 since groundwater not observed	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	
Sc - (Sr/Owr) x (Owc-Owmax)				
Predicted depth to seasonal high groundwater (Sh)	**7.4**	**feet**	(Agrees with Redoximorphic Features)	
	89	**inches**		

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-5

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	7.3	feet	7/22/21 Depth to weeping in TP-5	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	
Sc - (Sr/Owr) x (Owc-Owmax)				
Predicted depth to seasonal high groundwater (Sh)	**4.7**	**feet**	(Agrees with Redoximorphic Features)	
	57	**inches**		

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-6

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	10.5	feet	7/22/21 Depth to Weeping in TP-6	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	
Sc - (Sr/Owr) x (Owc-Owmax)				
Predicted depth to seasonal high groundwater (Sh)	**7.9**	**feet**	(Agrees with Redoximorphic Features)	
	95	**inches**		

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-7

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	10.4	feet	7/22/21 Depth to Weeping in TP-7	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	
Sc - (Sr/Owr) x (Owc-Owmax)				
Predicted depth to seasonal high groundwater (Sh)	**7.8**	**feet**	(Agrees with Redoximorphic Features)	
	94	**inches**		

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-8

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	10.8	feet	7/22/21 Depth to Weeping in TP-8	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	
Sc - (Sr/Owr) x (Owc-Owmax)				
Predicted depth to seasonal high groundwater (Sh)	**8.2**	**feet**	(Agrees with Redoximorphic Features)	
	99	**inches**		

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

TP-8

Frimpter Analyses - June/July 2021 Data
Jacobs - MBTA Rochester
BETA Group, Inc.

Field Measurements	**Depths**		**Comments**	
Measured depth to groundwater (Sc)	10.4	feet	7/22/21 Depth to Weeping in TP-9	
Reference USGS Well Data				
Measured depth to groundwater at similar time (OWc)	29.5	feet	6/22/2021	per USGS
Measured depth to maximum groundwater level (OWmax)	23.3	feet		per USGS
Maximum range of groundwater (OWr)	10.0	feet		per USGS
Range in groundwater levels in similar topography (Sr)	4.2	feet	5 % exceedence, per Frimpter Figure 12	

Sc - (Sr/Owr) x (Owc-Owmax)

Predicted depth to seasonal high groundwater (Sh)	**7.8 feet**
	94 inches

USGS Well:	Plymouth (120) 415217070393102
Geology:	**Sand/Gravel**
Topography:	**Stratified Drift, valley**

Appendix E:
Recharge Volume Calculations

RECHARGE VOLUME CALCULATIONS

Recharge Volume (REv) from Roadway and Parking Lot runoff:

REv (C.F.) = Impervious Area (S.F.) X 1 in. X Recharge Factor X 1 Ft./12”

Total Site Impervious Area= 205,037 S.F.

Recharge factor (Soil Type "B") = 0.35

Required REv (C.F.) = 205,037 S.F. X 0.35 X 1 Ft./ 12 in. = 5980 C.F.

TOTAL VOLUME REQUIRED= 5980 C.F.

TOTAL VOLUME PROVIDED: 41,400 C.F. New Sedimentation Basin

Volume Provided (41,400 C.F.) is greater than the Volume Required (5980 C.F.)

Recharge Volume (REv) from Building Roof runoff:

REv (C.F.) = Impervious Area (S.F.) X 1 in. X Recharge Factor X 1 Ft. / 12”

Total Impervious Area of Maintenance Building Facility roof = 28,800 S.F.

Recharge factor (Soil Type "B") = 0.35

Required REv (C.F.) = 28,800 S.F. 0.35 X 1 Ft./ 12 in. = 840 C.F.

VOLUME REQUIRED= 840 C.F.

TOTAL VOLUME PROVIDED: 21,263 C.F. within Expanded Basin

Volume Provided (21,263 C.F.) is greater than the Volume Required (840 C.F.)

Appendix F:
Water Quality Volume Calculations

1.0 " WATER QUALITY CALCULATIONS

Runoff from Parking, Roadways & Building Roof Impervious Surfaces

WQv (Cubic Feet) = Impervious Area **(S.F.) X 1.0 in. X 1 Ft. / 12 in.
WQv (Cubic Feet) = 205,037 S.F. X 1.0 in /12 in
WQv (Cubic Feet) = 17086 C.F. Requiring Water Quality Treatment

- ***Volume Provided = 62,263 C.F.* is Greater Than Volume Required= 17,086 C.F.***

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*
Total Runoff Volume Storage Provided:

New Sedimention Basin #2 = 41,400 C.F.
Existing Finger Swale & Expanded Basin #1= 21,263 C.F.

Total Volume Storage Provided: 41,400 C.F. + 21,263 C.F.= 62,263 C.F.

**
Project Site Impervious Areas:

Redeveloped Area of the project site : 134,688 S.F.
New Development Area of the project site: 70,349 S.F.

TOTAL IMPERVIOUS= 134,688 S.F.+ 70,349 S.F. = 205,037 S.F.

BMPs will drain dry within 72 hours:

Appendix G:
Stormwater Management System Operation and Maintenance Plan

Stormwater Management System
Operation & Maintenance Plan

The owner shall designate a qualified professional entity or individual to perform all monitoring & maintenance of the stormwater management system. The name, address and telephone number of the entity or individual shall be provided to the local Conservation Department, D.P.W and Engineering Department.

The project also includes provisions that will provide infiltration/groundwater recharge.

Stormwater Management Systems:

Refer to the attached site plan for location of all stormwater BMP's.

Inspections:

Stormwater Management structures, facilities and permanent BMP's must be inspected in accordance with this Stormwater Management System Operation and Maintenance Plan. All documentation on scheduled inspections, times of inspections, maintenance completed, remedial actions taken to make repairs, and any modifications or reconstruction of the storm water management system shall be submitted to the local Conservation Department, D.P.W. and Engineering department within (30) days of the inspection.

Disposal of the accumulated sediment must be in accordance with all applicable local, state, and federal guidelines and regulations. If any drainage structure or outfall indicates the presence of petroleum it shall be removed and disposed of immediately in accordance with all l applicable local, state and federal regulations.

Pavement Sweeping:

Parking lots, roads and all access ways and gutters must be swept clean of all sediment and debris on a Bi-Annual basis in spring and fall. The parking lot shall be swept clean on a Monthly basis.

Infiltration Systems /Catch Basins/Trench Drains:

All infiltration systems, catch basins and trench drains must be inspected and maintained every 3 months. Catch basins must be inspected to ensure they have adequate sump capacity, frames and grates are not damaged, and brick course is intact, oil/water separating devices are in place.

Catch basin sumps are to be cleaned out during bi-annual inspections in March and October of each year. Immediately clean the catch basin sump if two feet or more of sediment has accumulated within the catch basin.

If inspection indicates the presence of petroleum, it shall be removed immediately and disposed of off-site in accordance with all applicable local, state and federal regulations.

Good Housekeeping Operations:

1. Good housekeeping and material management reduce the risk of spills or other accidental exposure of
materials and substances to stormwater runoff.

A. All materials stored on-site will be stored in a neat, orderly manner in their appropriate containers
and under a roof or other weatherproof enclosure.

B. Products shall be kept in their original containers with the original manufacturer's label.

C. Substances should not be mixed with one another, unless recommended by the manufacturer.

D. Whenever possible, all of a product will be used up before disposing of a container.

E. Original materials labels and material safety data sheets which contain important information shall be kept on site.

F. Petroleum Products:

1.) All on-site vehicles and parking areas shall be regularly monitored for leaks and spills.
Spills encountered during monitoring must be cleaned immediately.

2.) Petroleum products shall be stored under cover and shall be in tightly sealed weather-proof containers which are clearly labeled.

G. Fertilizers:

1.) Fertilizers shall only be used in the minimum amounts as recommended by the manufacturer.

2.) The contents of any un-used fertilizer shall be transferred to a clearly labeled, weather proof sealable plastic bin, to avoid spillage.

I. Paints, Solvents:

1.) All paints and solvents shall be stored in original manufacturer's containers and in a weatherproof covered location.

2.) The use of paints and solvents shall, whenever possible, be limited to service or storage bays.

Where not possible, the work area shall be protected with impermeable drop clothes or tarps. At no point shall material be used in parking or success ways that are tributaries to the drainage system.

2. Spill Control Practices:

A. Manufacturer's recommended methods shall be clearly posted for spill clean-up and site

personnel shall be made aware of the procedures and the locations of clean-up information and

supplies.

B. Material and equipment necessary for spill clean-up will be kept on-site in a designated material

storage area. Equipment will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, absorbent materials, sand, sawdust, and plastic & metal trash containers specifically kept and labeled for this purpose.

C. All spills will be cleaned-up immediately after discovery.

D. Spills of toxic or hazardous material or nature will be reported to the appropriate state, local or

federal agency, as required by-law.

3. The spill prevention plan will include provisions to adapt the plan to ensure that spills will not re-occur, and how to clean up the spill if there is another one.

4. Site operations and daily use shall consider the ultimate disposition of stormwater and other site-generated forms of runoff. The washing of vehicles shall be limited to areas within the building, as they are served by the floor drain system. Wash water with its combination of solvents, detergents and oil/greases should not be allowed to enter any part of the on-site drainage system.

5. Snow plowing operations shall stockpile snow, ice and accumulated materials in areas where snow melt will flow into the on-site drainage systems, including drainage basins. No plowing or storage of snow into wetlands or areas draining to wetland is allowed.

6. During winter conditions salt and sand use site-wide shall be applied to the minimum extent possible to maintain safe conditions.

APPENDIX D – Wildlife Habitat Evaluation

DETAILED WILDLIFE HABITIAT EVALUATION

MBTA Rochester Maintenance Facility – Wildlife Habitat Evaluation
Bank Impact Area 1
Rochester, Massachusetts

APPENDIX B, PART 1 – NARRATIVE DESCRIPTION OF SITE

The Wildlife Habitat Evaluation was conducted on a portion of Bank associated with an unnamed intermittent stream along the eastern edge of the Massachusetts Bay Transportation Authority (MBTA) facility at 45 Kings Highway in Rochester, Massachusetts (the Site). The Banks are bounded on both sides by a Bordering Vegetated Wetland (BVW) complex. The Eastern portion of the Site largely consists of upland pine forest habitat and red maple swamp.

The proposed work involves clearing a portion of the BVW complex and adjacent upland to establish fill in support of the MBTA's proposed facility improvements (the Project). A retaining wall is proposed along the eastern edge of the Site which will be constructed partially within BVW and the intermittent stream channel. Impacted BVW will replicated onsite at a ratio of at least 1:1. To mitigate impacts to Bank and Land Under Water (LUW), the intermittent stream will be relocated southeast of the existing channel. Impacts associated with the Project include:

- 110 linear feet of Bank impacts;
- 4,240 square feet of BVW impact, 1,240 square feet of which is temporary; and,
- 550 square feet of LUW.

BANK TO STREAM HABITAT CONDITION AREA DESCRIPTION

Bank Impact Area 1 is located along a 110-foot portion of the onsite intermittent stream. The portion of the stream within Bank Impact Area 1 is a generally well-defined channel with an organic leaf litter substrate. Since water flow is intermittent, some sections of the stream channel dry out periodically while low-lying areas at the northern extent of the impact area may temporarily contain pools of water.

Vegetation in the area is dominated by species including sweet pepperbush (*Clethra alnifolia*), poison ivy (*Toxicodendron radicans*) and red maple (*Acer rubrum*). Trees within Bank Impact Area 1 are generally smaller than 12 inches diameter at breast height (DBH). Standing deadwood of similar size and density are also located along the of Bank. Mosses line the Banks and pooled areas within the stream channel north of Bank Impact Area 1 feature sphagnum moss hummocks.

Significant food sources are found in the area with abundant poison ivy and swamp dewberry (*Rubus* hispidus) dominating the herbaceous layer. Water does not pool long enough to support emergent vegetation in this area.

The density of dead trees in the area has resulted in an abundance of rotting wood on the ground that can be used as shelter for amphibians and small mammals. The low-growing sweet pepperbush provides nesting and shelter opportunities for small birds and mammals.

APPENDIX B, PART 1 – CERTIFICATION

The proposed project will alter Bank (to Intermittent Stream) beyond the thresholds set forth under 310 CMR 10.54(4)(a)5; however, it has been determined by a qualified individual that the impacts will be mitigated in accordance with 310 CMR 10.60(3).

The Project proposes 110 linear feet of alteration to Bank within areas that are significant to wildlife habitat. Alterations to Bank are associated with the installation of a retaining wall to accommodate expanded track and storage areas. Work includes excavation and backfill to install piles, all of which will be done from the west side of the stream, within areas of BVW slated to be filled.

Mitigation measures that have been proposed to minimize impacts and restore impacted habitat includes relocating the existing channel several feet to the south to facilitate any intermittent flow and the reestablishment of the natural vegetative community.

APPENDIX B, PART 2, SECTION III – IMPORTANT HABITAT FEATURES

Important habitat features present within Bank Impact Area 1 include:

- Abundant Upland/Wetland food plants;
- Dense Herbaceous Cover;
- Rocks, crevices, logs, tree roots or hummocks under water's surface;
- Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface;
- Standing water present at least part of the growing season, suitable for; Turtles and Non-breeding Amphibians;
- Sphagnum hummocks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring; and,
- Undercut/overhanging Banks.

ABUNDANT UPLAND/WETLAND FOOD PLANTS

As noted in the Plant Inventory of Appendix B, the herbaceous layer of vegetation in the area is dominated by swamp dewberry and poison ivy. These are both fruit-producing plants which are frequently grazed on by birds and white-tailed deer. These species were found mostly on the southeastern bank between flags B1-217 and B1-218.

DENSE HERBACEOUS COVER

While this portion of bank is vegetated with small trees and large shrubs, the understory is covered in large, dense patches of swamp dewberry and poison ivy. The poison ivy in this area has not established as climbing woody vines, but instead grows along the ground with the swamp dewberry. This provides areas of dense herbaceous cover for smaller mammals and amphibians.

STANDING WATER PRESENT AT LEAST PART OF THE GROWING SEASON, SUITABLE FOR; TURTLES AND NON-BREEDING AMPHIBIANS – AND – SPHAGNUM HUMMOCKS OR MATS

BETA observed an area of pooled water within the stream channel and the proposed Bank Impact Area 1. Pooled water extended from B1-214 to the east within the stream channel, outside of Bank Impact Area 1. This pooled area contained small sphagnum hummocks but did not support any other vegetation. Dense shrubs growing over the stream channel also provides protection to amphibians and reptiles by regulating water temperature and protecting water quality.

It is likely that the accumulation of water here was caused by a recent storm event and the existence of sphagnum moss implies that this area frequently accumulates water during storm events. However, sphagnum growth is sparse and only a small portion of the pooled area is within Bank Impact Area 1 and thus only a small percentage of the pooled area will be impacted by the proposed work.

Rocks, crevices, logs, tree roots or hummocks under the water's surface – and – up to 1m above the water's surface – and – Undercut/ Overhanging banks

BETA observed one instance where a tree is growing out of the western bank, where the roots created a small cavity that extends down under the water. This cavity is small and is the only one observed during the assessment; therefore, it does not appear to be a significant habitat feature within Bank Impact Area 1.

Appendix B, Part 2, Section V – Habitat Degradation

Habitat degradation at the Site includes the following:

Other Human Disturbance

As part of the previous work completed at the Site, a silt fence and a chain link fence were installed to demarcate the limits of work. These remain in place upgradient of Bank Impact Area 1. These features create a barrier to species migrating between the wetland and the adjacent upland habitats, which are within the limit of work and currently inaccessible.

Summary

Bank Impact Area 1 is a relatively small portion of the intermittent stream that flows within the eastern extent of the Site. This stream channel and Banks provide ample cover and food sources for local wildlife.

While this area contains many of the habitat features observed throughout the adjacent BVW, a significant percentage of habitat will not be altered. Based on proposed mitigation methods, impacted areas will be replicated in-kind, mitigating any impacts to wildlife habitat.

The dense cover provided by sweet pepperbush is anticipated to easily reestablish in future growing seasons. A majority of the trees growing in this area are immature; therefore, the loss of forested canopy will be minimal and will return to its natural state. Herbaceous cover will be replaced with the application of a seed mix consisting of native, hydrophytic species immediately after stream replication work is completed. This is anticipated to provide new food sources for wildlife.

In summary, proposed work within Bank Impact Area 1 will not impact a significant percentage of the overall wildlife resources in this area. The proposed mitigation measures will adequately replace all lost habitat function. Therefore, the Project will not result in an adverse effect on wildlife habitat associated with Bank.

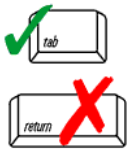
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



MBTA Rochester Maintenance Facility
Project Name

Rochester, MA
Location

110 lf (Bank)
Size of Area Being Impacted

9/7/2021
Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Bank Impact Area 1	110 lf			110 lf
2.				
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

(See attached Narrative)

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

Tyler Drew
Typed or Printed Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

Rochester, MA
Project Location (from NOI page 1)

Bank Impact Area 1
Impact Area (number/name)

9/7/21
Date(s) of Site Visit(s) and Data Collection

75* F, Sunny
Weather Conditions During Site Visit (if snow cover, include depth)

Tyler Drew — Person completing form per 310 CMR 10.60(1)(b)

9/7/2021 — Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Signature

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Riverine — Subsystem: Intermittent

Class: Streambed — Subclass: Organic

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☐ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☒ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

N/A
Community Name

N/A
Vegetation Description

N/A
Physical Description

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	5%	90%	0%	40%	30%
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Acer rubrum*	Tree	Quercus rubra
Shrub	Clethra alnifolia*	Shrub	Sassafras albidum
Herb	Toxicodendron radicans*	Herb	Rubus hispidus
Herb	Osmundastrum cinnamomeum	Herb	Osmunda regalis

C. Inventory (Soils)

Massasoit - Mashpee Complex
Soil Survey Unit

Drainage Class

Sandy
Texture (upper part)

10"
Depth

2" to saturation
Depth to Water Table

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☒ Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☒ Abundant ☐ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☒ Present ☐ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

6-12" dbh	12-18" dbh	18-24" dbh	> 24" dbh
4	0	0	0

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☐ Present ☒ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

☒ Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☒ Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☒ Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Present ☒ Absent

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☒ Non-breeding amphibians (foraging, re-hydration)

☒ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☒ Present ☐ Absent

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Present ☒ Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Present ☒ Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Present ☒ Absent

Undercut or overhanging banks (small mammals, mink, weasels)

☒ Present ☐ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☐ Present ☒ Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Present ☒ Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

[1] 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No
For upland resource areas is the impact area part of contiguous forested habitat at least			
(forest interior nesting birds)	50 acres in size?	☐ Yes	☒ No
	100 acres in size?	☐ Yes	☒ No
	250 acres in size?	☐ Yes	☒ No
	500 acres in size?	☐ Yes	☒ No
(grassland nesting birds)	> 1.0 acre in size?	☒ Yes	☐ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☒ No

B. **Connectivity with adjoining natural habitats**

- ☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- ☒ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- ☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- ☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- ☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- ☐ Evidence of significant chemical contamination
- ☐ Evidence of significant levels of dumping
- ☐ Evidence of significant erosion or sedimentation problems
- ☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- ☐ Disturbance from roads or highways ☒ Other human disturbance
- ☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8
Standing Dead Trees	4	13	0
Trees <12"DBH	4	34	26
Trees 12-18"DBH	0	34	26